PB82-185828

Master Project Facilities Plan, Expansion of Reno-Sparks Joint Water Pollution Control Plant Cities of Reno and Sparks, Nevada: Summary

(U.S.) Environmental Protection Agency
San Francisco, CA

15 Sep 80

U.S. Department of Commerce
National Technical Information Service
NTIS

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO.	2.	3. Recipient's Accession No. PB82-185828
4. Title and Subtitle: Draft Environmental Impact Statement Reno Sparks Joint Water Pollution Control Plant Master Project Facilities Plan Summary			5. Report Date: Sept. 15, 1980
			6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address: U.S. Environmental Protection Agency, 215 Fremont St., San Francisco, CA 94105			10. Project/Task/Work Unit No.
			11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address			13. Type of Report & Period Covered
			14.

15. Supplementary Notes

With technical assistance from Jones and Stokes Inc.

16. Abstract (Limit: 200 words)

The purpose of the Master Project Facilities Plan, Expansion of Reno-Sparks Joint Water Pollution Control Plant (JWPCP), is to determine the optimum method of increasing the capacity of the existing wastewater treatment plant serving the cities of Reno and Sparks. The expansion of the JWPCP from 20 mgd to 30 mgd under the Early Start Program (ESP) is nearly complete. The effluent will continue to be discharged to the Truckee River. The Master Project Facilities Plan encompasses the expansion of the ESP JWPCP facilities from 30 mgd to 40 mgd to accommodate projected growth until about year 2000.

The Facilities Plan analyzed a number of alternatives incorporating several treatment and effluent disposal concepts. Summary descriptions of existing facilities and Master Project alternatives are given.

It is concluded in this Draft EIS that the potential for significant adverse impacts exists with all JWPCP alternatives as presently proposed in the cities' Facilities Plan.

The purpose of this Environmental Impact Statement is to publicly present all of the issues surrounding the project and its objectives, so they can be resolved as openly and satisfactorily as possible.

17. Document Analysis a. Descriptors

Sewerage
Wastewater Treatment
Wastewater Disposal
Sludge Disposal

b. Identifiers/Open-Ended Terms

Reno, NV
Sparks, NV
Truckee River
Environmental Impact Statement
Cui-ui
Lahontan Cuthroat Trout
Package Wastewater Treatment Plants

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
	20. Security Class (This Page)	22. Price

(See ANSI-Z39.18) See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA-9-CA-C-32-0114 D

PB82-185828

Draft Environmental Impact Statement

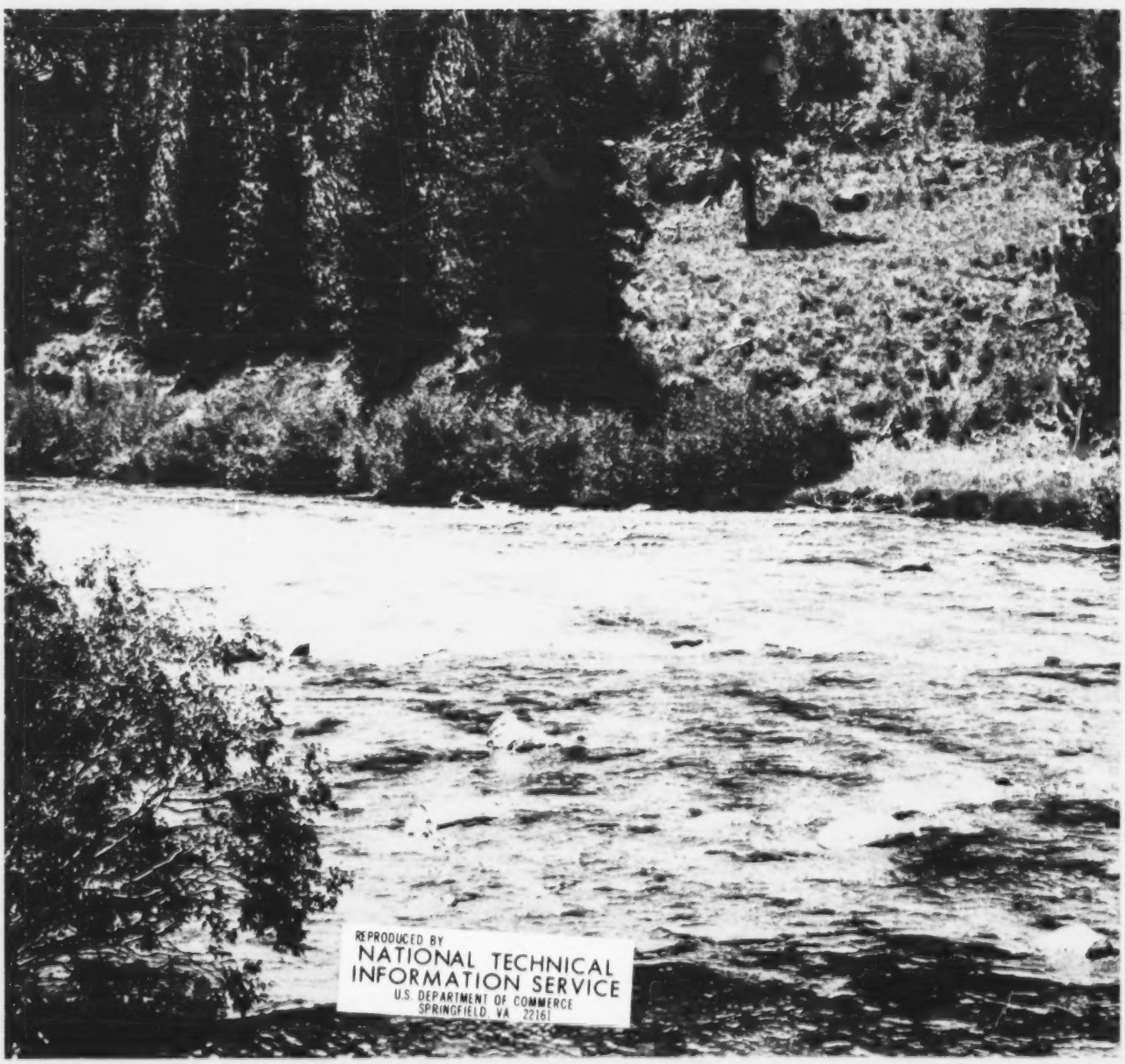
SUMMARY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

MASTER PROJECT FACILITIES PLAN

Expansion of Reno-Sparks Joint Water Pollution Control Plant

Cities of Reno and Sparks, Nevada



REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

DRAFT
ENVIRONMENTAL IMPACT STATEMENT

RENO-SPARKS JOINT WATER POLLUTION CONTROL PLANT MASTER PROJECT

Prepared by:

U. S. Environmental Protection Agency
Region IX
215 Fremont Street
San Francisco, CA 94105
Thomas Severino, Project Officer

With Technical Assistance From:

Jones & Stokes Associates, Inc.
2321 P Street
Sacramento, CA 95816

September 15, 1980

Grant Number
C-32-0114

Responsible Official

Sheila M. Prindiville

Sheila M. Prindiville
Acting Regional Administrator
Environmental Protection Agency
Region IX

TABLE OF CONTENTS

	Page
INTRODUCTION	1
Background and History of the Project	1
Project Objectives	3
Purpose and Necessity of This EIS	3
CONCLUSIONS	5
EXISTING WASTEWATER CONVEYANCE, TREATMENT AND DISPOSAL IN THE TRUCKEE MEADOWS	7
Existing NPDES Permit	7
Package Wastewater Treatment Plants	7
Reno-Sparks JWPCP	9
Combined Sewer Separation	10
MASTER PROJECT: ALTERNATIVES FOR WASTEWATER TREATMENT AND DISPOSAL	11
Introduction	11
Master Project Planning Criteria	11
Description of Master Project Alternatives Selected for Detailed Analysis	11
Advanced Wastewater Treatment Alternatives - Truckee River Discharge	13
Secondary Treatment Discharge to Land	14
Secondary Treatment with Phosphorus Removal and Filtration Discharge to Truckee Canal	14
Sludge Disposal at Spanish Springs Valley	14
Summary of Alternative Wastewater Treatment Process Costs	14
Actions Proposed by Reno and Sparks	15
Allocation of Recommended Project Costs	17
Impact Comparison of Alternatives Recommended by Reno-Sparks to Other Alternatives	18

Page

ENVIRONMENTAL CONSIDERATIONS RELATIVE TO THE SELECTION OF THE RENO-SPARKS JWPCP MASTER PROJECT

OPERATIONS IMPACTS: LONG-TERM DIRECT AND SECONDARY EFFECTS OF WASTEWATER TREATMENT AND DISPOSAL 23
- Impacts Common to the Master Project 23
  - Common Advantages 29
  - Common Disadvantages 31
  - Mitigation of Common Impacts 35
- Impacts of Truckee Canal Disposal (Alternative L-1) 35
  - Advantages 36
  - Disadvantages 36
  - Surface Hydrology 36
  - Water Quality 37
  - Fish and Wildlife 41
  - Groundwater 41
  - Public Health 42
  - Cultural Resources 42
  - Institutional Concerns 42
  - Enery 43
  - Mitigation of Truckee Canal Disposal Impacts 43
- Impacts of Effluent Disposal to the Truckee River (Alternatives T-5, 6a, 9, 12, 14a, 15) 45
  - Surface Water Hydrology 46
  - Water Quality 46
  - Fish and Wildlife 49
  - Groundwater 50
  - Water Supply 50
  - Potential Risks to Public Health 51
  - Cultural Resources 51
  - Institutional Considerations 51
  - Energy 51
  - Mitigation of Truckee River Disposal Impacts 52
- Impacts of Land Disposal at Dodge Flat (Alternatives L-6 and L-7) 53
  - Surface Hydrology 54
  - Water Quality 55
  - Fish and Wildlife 56
  - Groundwater 58
  - Risks to Public Health 58
  - Cultural Resources 58
  - Land Use 58
  - Institutional Concerns 59
  - Energy 59
  - Mitigation of Dodge Flat Land Disposal Impacts 59
- Impacts of JWPCP Sludge Handling and Disposal 61
  - Sludge Pipeline Impacts 62
- Short-Term Construction Impacts of the Master Project 64

REFERENCES 65

LIST OF TABLES

Table		Page
1	Effluent Discharge Limitations Used in the Detailed Screening Analysis	12
2	Summary of Costs Used in Detailed Screening Analysis	16
3	Summary Comparison of the Environmental Consequences of Alternative Reno-Sparks JWPCP Master Project	24
4	Summary Characteristics of Environmental Conditions in Truckee River Reaches, Pyramid Lake and Lahontan Reservoir	Follows 30

LIST OF FIGURES

Figure		
1	Sewer Service Area Boundaries	8

THIS IS A SUMMARY OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT WHICH IS AVAILABLE THROUGH EPA REGION IX. TOM SEVERINO, EPA, REGION IX, 215 FREMONT STREET, SAN FRANCISCO, CALIFORNIA, 94105 (415) 556-8086

Expansion of Reno-Sparks Joint Water Pollution Control Plant Draft Environmental Impact Statement Summary Report

INTRODUCTION

Background and History of the Project

Sewage treatment for the Cities of Reno and Sparks is provided by the Reno-Sparks Joint Water Pollution Control Plant (JWPCP). The JWPCP, located on the south bank of the Truckee River east of Steamboat Creek, discharges secondary treated effluent to the Truckee River via Steamboat Creek. The Reno-Sparks JWPCP was completed in 1967 with a design capacity of 20 million gallons per day (mgd). The cost of the plant was divided equally between the Cities of Reno and Sparks, providing each with one-half of the plant's capacity.

In 1972, with the JWPCP nearing its treatment capacity, the City of Reno was advised by the Nevada Bureau of Environmental Health (now called the Nevada Division of Environmental Protection [NDEP]) that an expansion project would have to include phosphorus removal to comply with receiving water quality standards issued by the NDEP on July 1, 1967.

In 1975, Kennedy Engineers (now Kennedy/Jenks Engineers), under a contract with the City of Reno, completed a facilities plan to expand and upgrade the JWPCP to a capacity of 40 mgd including phosphorus removal. The recommended project was planned to meet effluent quality limitations outlined in the National Pollutant Discharge Elimination System (NPDES) permit issued by EPA on January 10, 1975.

The EPA began preparation of an Environmental Impact Statement (EIS) on the 1975 Draft Facilities Plan. During the course of the EIS work, several water quality studies suggested the need for additional and more stringent effluent

quality limitations than were specified in the 1975 NPDES permit. It was decided by the EPA that the expansion and upgrading of the JWPCP would require more time than originally scheduled to address these water quality concerns. At the same time, however, flows to the JWPCP were reaching design capacity, and the need for an expansion of the JWPCP was becoming critical. It was decided that the expansion and upgrading of the JWPCP should be phased or segmented to provide the needed treatment capacity on an interim basis to allow sufficient time to adequately address all environmental concerns.

On December 7, 1976, the Department of the Interior expressed concern regarding the effect of the JWPCP effluent and Truckee River water quality on the endangered cui-ui and threatened Lahontan cutthroat trout. The following day the City of Reno, at the suggestion of Kennedy/Jenks Engineers, proposed that a project be authorized immediately and concurrently to expand the JWPCP capacity and to study Truckee River water quality to better define the necessary level of treatment.

In 1976, the City of Reno and the EPA agreed that the project should be segmented into an Early Start Project (ESP), consisting of an immediate expansion of the JWPCP to 30 mgd capacity, and the development of a Master Project which would deal with required types of treatment, 20-year capacity needs, effluent disposal, and sludge handling and disposal. In October 1976, EPA authorized the preparation of a facilities plan and environmental assessment (EA) for an ESP. On June 7, 1978, EPA issued a Negative Declaration on the construction of the ESP. Construction of the ESP began in October 1978, and it is expected to begin operation in 1980. It should be noted that sludge handling and disposal was not included in the ESP.

In September 1977, Pacific Environmental Laboratory (PEL), a division of Kennedy/Jenks Engineers, began a comprehensive Truckee River water quality study.

In October 1978, Kennedy/Jenks Engineers began preparation of a new Master Project Facilities Plan for the JWPCP based on the April 1977 NPDES permit and other criteria. The Draft Master Project Facilities Plan was completed in April 1980.

Due to the extended schedule for completion of the Master Project Facilities Plan, the need for a long-term solution for sludge disposal has also become critical. It became desirable, therefore, to develop an Early Start Sludge Program (ESSP), as part of the Master Project.

Project Objectives

The following objectives appear to be important to the resolution of wastewater-related problems in the Truckee River basin.

- Provide a cost-effective, institutionally agreeable sewerage system that provides adequate wastewater treatment and disposal for the 20-year planning period for the Cities of Reno and Sparks.
- To improve the quality of water in the Truckee River.
- To optimize the beneficial reuse of treated effluent.
- To minimize the adverse environmental, social, cultural, and economic effects of wastewater disposal and treatment capacity expansion.
- Avoid jeopardy to the endangered cui-ui and threatened Lahontan cutthroat trout.

Purpose and Necessity of This EIS

The placement and operation of the Master Project will have significant environmental, social and economic impacts. The importance of these impacts caused EPA to prepare an EIS on this project. The National Environmental Policy Act (NEPA) of 1969 requires "all agencies of the federal government to the fullest extent possible carry out the provisions of NEPA by building into agency decision making appropriate and careful consideration of the environmental effects of proposed actions and avoiding or minimizing the adverse effects of these actions". The environmental review document, in this case the EIS, is to be a "full disclosure" document and must follow specific regulations of the Council on Environmental Quality (CEQ).

CONCLUSIONS

It is concluded in this Draft EIS (DEIS) that the potential for significant adverse impacts exists with all JWPCP alternatives as presently proposed in the cities' Facilities Plan. Public release and review of this EIS should further focus attention on the identified issues, and lead to further planning work to formalize acceptable solutions to the identified needs and problems.

The purpose of this EIS is to publicly present all of the issues surrounding the project and its objectives, so they can be resolved as openly and satisfactorily as possible. In keeping with this open policy, the EIS has been developed as part of a decision process to select the most desirable wastewater management alternative and to determine the appropriate treatment capacity in accordance with local, state, and federal regulations and objectives. Comments received on the DEIS, both at the public hearing and by letter, will be very useful in the selection of the most environmentally sound wastewater treatment and disposal project.

Following the comment period and selection of a project eligible for federal funding under Section 201 of PL 92-500 as amended, a Final EIS (FEIS) will be prepared and distributed by the EPA.

The distribution list for this DEIS is included at the end of the report. Written comments on the DEIS should be forwarded to:

Mr. Thomas Severino, Project Officer
U. S. Environmental Protection Agency
Region IX
215 Fremont Street
San Francisco, CA 94105

Preceding page blank

EXISTING WASTEWATER CONVEYANCE, TREATMENT AND DISPOSAL IN THE TRUCKEE MEADOWS

Existing NPDES Permit

The Reno-Sparks JWPCP operates under NPDES Permit No. NO0020150, which was issued in April 1977 as a two-step permit; the first step being applicable from May 1, 1977 to June 30, 1977, and the second step from July 1, 1977 to April 30, 1982. Both portions of the 1977 NPDES permit were superseded by the presently valid interim permit. It is expected that a new permit will be issued by the NDEP when the interim permit expires.

Wastewater treatment in the Truckee Meadows is accomplished by one of three different methods: individual subsurface disposal systems (septic tanks), package treatment plants, or the Reno-Sparks JWPCP. Individual subsurface disposal systems (septic tanks) are often used for treatment in low density areas where subsurface conditions permit. For higher density residential or commercial developments which are not served by the JWPCP, package wastewater treatment plants are used, and regional treatment at the JWPCP is provided for remaining wastewater flows. The presently projected year 2000 and ultimate sewer service areas for the JWPCP are outlined in Figure 1. At the present time, the estimated division of wastewater flow within the Truckee Meadows to each of the methods of treatment is about 16 percent to septic tanks, 4 percent to package plants, and 80 percent to the JWPCP.

Package Wastewater Treatment Plants

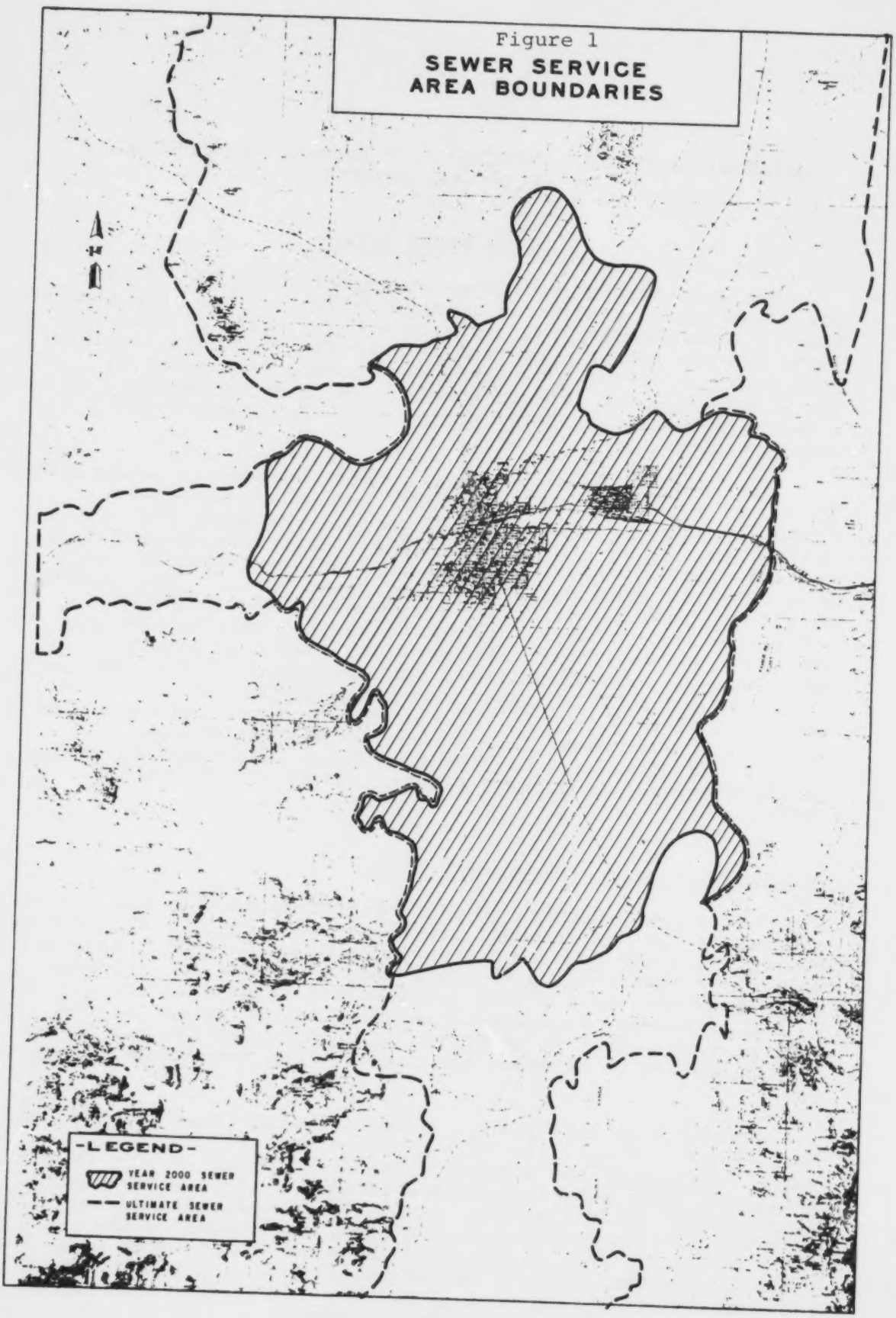
The second approach to wastewater treatment in the Truckee Meadows is the use of small treatment facilities, i.e., package plants, that are purchased preassembled and generally require only minor construction to place them in operation. Package wastewater treatment plants treat an estimated 4 percent of the wastewater flow generated in the study area. At the present time, the City of Sparks will not allow package plants within its limits, whereas the City of Reno and Washoe County will.

Before a package plant can be installed several conditions must be met. First, the Package Plant Review Committee, which consists of the Cities of Reno and Sparks, Washoe County, WCOG, and NDEP, must recommend approval of the installation. It should be noted that this committee was established in December 1978 in response to EPA grant conditions on the ESP. Secondly, the jurisdiction in which the proposed plant would be located (Reno or Washoe County), must approve the project. Thirdly, any package plant using a surface discharge must obtain a NPDES permit from the NDEP.

Preceding page blank

Figure 1

SEWER SERVICE AREA BOUNDARIES



A review of the permits and permit applications on file with the NDEP indicates that in January 1980 there were 14 package wastewater treatment plants either under construction or operating in the Truckee Meadows area. Seventeen package plants have been proposed for various locations in the Truckee Meadows. These proposed plants are at various stages in the planning and review process.

Reno-Sparks JWPCP

Since its completion in 1967, Sparks, the NPDES permit holder, has had direct responsibility for the operation and maintenance (O&M) of the JWPCP. Costs for O&M are paid by each city according to its proportion of the plant flow. From 1977 through 1979, the City of Reno generated about 15.39 billion gallons of wastewater and the City of Sparks 4.6 billion gallons of wastewater. Consequently, Reno contributed approximately 77 percent and Sparks 23 percent of the O&M costs over this 3-year period.

The JWPCP provides primary and secondary wastewater treatment for domestic and industrial wastes. The plant was originally designed to treat an average daily flow of 20 mgd, but is permitted by the NDEP to treat up to 24 mgd until the ESP facilities become operational. Following preliminary treatment, in-line basins provide primary settling, aeration using the conventional activated sludge process, and final clarification. Postaeration for oxygenating the effluent is provided prior to chlorination. Dechlorination with sulfur dioxide is provided prior to disposal into Steamboat Creek, a tributary to the Truckee River.

Sludge generated in both the primary and secondary treatment processes is treated on-site by anaerobic digestion. Since April 1979 liquid sludge has been injected into the soils on 80 acres of city-owned land adjacent to the JWPCP. This practice is anticipated to continue until new disposal sludge facilities are placed into operation.

Costs for wastewater treatment are borne initially by the City of Sparks and consequently Sparks is responsible for budgeting and cost accounting. Costs for fiscal years 1977 to 1979 are as follows:

Fiscal Year	Flow Treated mg	Expenditures ($1,000)	Cost* $/mg
1977	6,431.3	990.7	154
1978	6,380.2	1,156.7	181
1979	7,202.9	1,881.0	261
1980	7,500.0 (est.)	2,100.0 (est.)	280 (est.)

*The major discontinuity in costs between 1978 and 1979 is caused by the change in method of sludge disposal required by NDEP.

The ESP consists of the expansion of the 24 mgd plant capacity to 30 mgd and the addition of phosphorus removal using the PhoStrip treatment process. Permanent chlorination and dechlorination facilities will be installed by modifying the existing chlorination facilities.

Current Effluent Quality and Operational Limitations. Wastewater tributary to the Reno-Sparks JWPCP is principally domestic wastewater, with little industrial influence. Wastewater from the gaming establishments is very similar to domestic wastewater, although the former has a higher solids content due to food wastes from the many restaurant facilities associated with the gaming establishments. There are no records of industries which discharge industrial process water to the sewer system.

Combined Sewer Separation

Combined sewers carry both wastewater and stormwater to the treatment plant, and are a partial cause of increased wastewater treatment plant flows during storm conditions. The City of Sparks has no known combined sewers in its wastewater collection system. In Reno, however, the older sections of the collection system utilize combined sewers. Reno has eliminated about two-thirds of the combined sewers in the last 12 years and expects to remove virtually all of them by 1983.

MASTER PROJECT: ALTERNATIVES FOR WASTEWATER TREATMENT AND DISPOSAL

Introduction

The comparative evaluation of project alternatives should include an analysis of the environmental impacts, commitments of resources, costs and societal risks associated with each feasible alternative. The reasons why a proposed alternative management system is finally selected must be explained in detail. This section contains a cost and engineering description of the alternatives considered for the Master Project. The information on which the descriptions are based is contained in: Cities of Reno and Sparks, Expansion of Reno-Sparks JWPCP, Master Project Facilities Plan Draft by Kennedy/Jenks Engineers (1980). The reader is referred to this document for detailed information regarding facilities planning.

Master Project Planning Criteria

The alternatives proposed in the Facilities Plan must provide sufficient capacity to meet sewerage needs for 20 years from initiation of project construction, regardless of whether the initial increment of construction is sufficient for the entire 20 years. It was decided that no change would be made in the proposed design capacity of 40 mgd, recommended initially in the 1975 Draft Facilities Plan, because population growth and sewage generation projections are too imprecise to do otherwise at this time. The 40 mgd flow was calculated using a projected total equivalent population of 296,180 (including tourists) and a per capita flow of 135 gpcd. A second reason for using 40 mgd is based upon sizing of existing clarifiers and aeration basins. The clarifiers have all been constructed with capacities of 6.66 mgd and the aeration basins with capacities of 10 mgd. The lowest common denominator of these two capacities is 40 mgd.

The approved surface water quality standards affect future NPDES requirements, and therefore the types of treatment processes which are evaluated by the Facilities Plan. The effluent limitations in Table 1 were used for project planning for the feasible alternatives.

Description of Master Project Alternatives Selected for Detailed Analysis

From the alternatives initially evaluated, nine were selected for detailed evaluation. Six of these nine alternatives use the Truckee River for effluent disposal, two alternatives use land application at Dodge Flat and the ninth uses

Table 1. Effluent Discharge Limitations Used in the Detailed Screening Analysis

	Truckee River Discharge Alternatives[1] (T-5, T-6a, T-9, T-12, T-14a T-15)	Land Application Alternatives[2]	
		Truckee Canal Diversion (L-1)	Dodge Flat (L-6, L-7)
BOD (5-day, 20°C) - mg/l	8	4	7
Suspended Solids - mg/l	8	<5	14
Chlorine Residual - mg/l	0.01	-	-
Total Phosphorus (P) - mg/l	0.6	0.4	6.0
Total Nitrogen (N) - mg/l	6.0	21.5	21.5
Ammonia Nitrogen (N) - mg/l	0.5	16	16
Nitrate Nitrogen (N) - mg/l	4	1.0	1.0
Nitrite Nitrogen (N) - mg/l	0.1	1.5	1.5
Unionized Nitrogen (N) - mg/l	0.03	-	-
Total Organic Nitrogen (N) - mg/l	-	3.0	3.0
Total Dissolved Solids - mg/l	500	350	350
pH Range	6.5-8.0	6.5-8.0	6.5-8.0

[1]Values shown are daily averages computed from a minimum of four sample values at 6-hour intervals.
[2]Values are annual means.

the Truckee Canal. The nine alternatives selected by Reno-Sparks for detailed evaluation are as follows.

Advanced Wastewater Treatment Alternatives - Truckee River Discharge

T-5: Wastewater would receive secondary treatment with PhoStrip phosphorus removal, fluidized bed nitrification/denitrification, gravity filtration, chlorination and dechlorination using sulfur dioxide. Effluent discharge would be to the Truckee River at one of three locations.

T-6a: Wastewater would receive secondary treatment with PhoStrip for phosphorus removal, activated biological filtration for nitrification, an anaerobic reactor for denitrification, gravity filtration, chlorination, and dechlorination using sulfur dioxide. Effluent discharge would be to the Truckee River.

T-9: Wastewater would receive secondary treatment with PhoStrip phosphorus removal, gravity filtration, ion exchange ammonia removal, chlorination, and dechlorination with sulfur dioxide. Effluent discharge would be to the Truckee River.

T-12: Wastewater would receive secondary treatment with PhoStrip phosphorus removal and trickling filters and trickling filters enclosed in an anaerobic reactor for nitrification and denitrification, respectively. Effluent would be chlorinated and dechlorinated, with disposal to the Truckee River.

T-14a: Wastewater would receive secondary treatment with nitrification provided by an activated biological filter (as in T-6a), denitrification would be provided in a subsequent fluidized bed denitrification reactor (as in T-5), PhoStrip phosphorus removal and side-stream flow equalization prior to denitrification. Effluent would be chlorinated and dechlorinated with disposal to the Truckee River.

T-15: Wastewater would receive secondary treatment with PhoStrip phosphorus removal, nitrogen removal by a combination of the trickling filter nitrification concept used in Alternative T-12 and the fluidized bed concept used for denitrification in Alternative T-5, gravity filtration and chlorination and dechlorination using sulfur dioxide. Effluent disposal would be to the Truckee River.

Secondary Treatment Discharge to Land

L-6: Wastewater would receive secondary treatment only. Side-stream flow equalization facilities would be added after the chlorination facilities. A pipeline would carry the secondary effluent to Dodge Flat, where it would be used for agricultural irrigation during the summer months and for groundwater recharge (rapid infiltration) during the winter months.

L-7: Wastewater would receive secondary treatment only. All effluent would be conveyed by gravity pipeline to the Dodge Flat area, where it would be utilized during the summer for irrigation. During the winter, it would be diverted through a new gravity pipeline to the Fernley drain.

Secondary Treatment With Phosphorus Removal and Filtration, Discharge to Truckee Canal

L-1: Wastewater treatment would consist of secondary treatment, phosphorus removal by the PhoStrip process, gravity filtration and chlorination. A gravity pipeline would be constructed from the Joint Water Pollution Control Plant to the Truckee Canal immediately below Derby Dam. Just below Derby Dam, effluent would be discharged to the Truckee Canal on a continuous year-round basis.

Sludge Disposal at Spanish Springs Valley

Alternative S-12 was selected from among 21 sludge disposal alternatives for implementation by the Cities of Reno and Sparks. Liquid sludge would be pumped from the JWPCP through an 8-inch force main to a 460-acre site in Spanish Springs Valley that will be dedicated to sewage sludge disposal. Liquid sludge will be sprayed on 255 acres using center-pivot irrigation systems.

The Board of County Commissioners recently voted against using Spanish Springs Valley as a land disposal site for liquid sludge. As a result, dewatering facilities, the perched bed alternative or other methodologies may be employed.

Summary of Alternative Wastewater Treatment Process Costs

Costs of the nine alternatives vary widely, as some require rather complex advanced wastewater treatment processes with high annual operation and maintenance costs, and others

less complicated land application alternatives which require rather extensive capital facilities. A summary of initial capital costs, annual operational costs, and total present worth costs is shown in Table 2. The majority of these alternatives are classified as alternative or innovative according to EPA definition and would therefore qualify for 85 percent federal funding. The two alternatives which are neither alternative nor innovative would still qualify for 75 percent federal funding.

As shown in Table 2, Alternative L-1 has the lowest present worth cost of any of the alternatives, and Alternative T-6a is the next lowest cost alternative. The remaining seven alternatives, arranged in order of increasing cost, are T-14a, T-15, T-5, T-12, L-6, L-7, and T-9.

Actions Proposed By Reno and Sparks

The Master Project Facilities Plan (Kennedy/Jenks Engineers, 1980) prepared for the Cities of Reno and Sparks identifies a recommended facilities plan for wastewater treatment and sludge disposal. A summary description of their recommendations follows.

Based upon detailed analysis level estimates, Alternative L-1, Truckee Canal Diversion, is the most cost-effective effluent disposal alternative by a considerable margin. Although implementation of Alternative L-1 may require extensive action on the part of the cities, the alternative does present the best combination of low total present worth and low annual O&M expenditure as compared to the other viable alternatives. Therefore, Alternative L-1, Truckee Canal Diversion, is recommended as the apparent best wastewater project.

Alternative S-12, Liquid Sludge to Spanish Springs Valley with Dedicated Land Disposal, is recommended as the apparent best sludge disposal project.

Recommended Plan

Description

General

The recommended plan consists of the following:

Table 2. Summary of Costs Used in Detailed Screening Analysis (including sludge handling)

	Alternative	Initial Capital Cost - $	Annual Operational Cost - $/yr	Total Present Worth Cost[1] - $
	T-5 Fluidized bed nitrification/denitrification	35,000,000[2]	2,380,000	58,950,000
*	T-6a Modified PhoStrip nitrification/denitrification	35,690,000[2]	1,030,000	45,170,000
	T-9 Selective ion exchange	44,370,000	2,630,000	71,010,000
	T-12 Trickling filter nitrification/denitrification	36,350,000	2,280,000	59,370,000
	T-14a Modified PhoStrip with denitrification polishing	38,090,000[2]	1,420,000	51,650,000
	T-15 Trickling filter nitrification/fluidized bed denitrification	33,310,000[2]	2,250,000	55,920,000
*	L-1 Truckee canal diversion	37,020,000[2]	650,000	40,750,000
*	L-6 Dodge Flat irrigation with rapid infiltration	63,760,000[2]	640,000	60,210,000
	L-7 Dodge Flat irrigation with Fernley drain	65,520,000[2]	350,000	61,440,000

[1]Calculated using 6 7/8 percent and 20-year life.

[2]Portions of these alternatives are considered as either "alternative" or "innovative" according to EPA definition.

1. *Increasing the influent sewage pumping capacity by adding a sewage pump and modifying the pump discharge pipes.*

2. *Increasing the primary-secondary treatment capacity from 30 mgd to 40 mgd by adding sedimentation tanks similar to the existing tanks.*

3. *Increasing the capacity of phosphorus removal capability by adding a phosphorus stripping tank with appurtenances as required to employ the PhoStrip process.*

4. *Increasing the degree of treatment to provide tertiary filtration by adding gravity filters with appurtenances including a flow equalization basin.*

5. *Implementing effluent reuse by transporting the effluent to the Truckee Canal by a gravity pipeline.*

6. *Providing for handling increased quantities of sludge by adding a digestion tank and sludge pumping and piping facilities for transporting liquid digested sludge to a disposal site in Spanish Springs Valley.*

The proposed action is that of the Facilities Plan engineer and the two cities. The EPA does not have a facilities plan to recommend at this time. The EPA will review and evaluate the Reno-Sparks Facilities Plan in concert with the Draft EIS, comments made on the Draft Facilities Plan and the Draft EIS, State of Nevada recommendations, and other information and data before making a final determination on a project eligible for a grant award under Section 201 of the Clean Water Act.

Allocation of Recommended Project Costs

The costs for the recommended project consist of costs to bring the capacity of the ESP facilities up to a treatment capacity of 20 mgd, costs to increase the degree of treatment provided, costs to provide other improvements common to the full 40 mgd of treatment capacity, and costs of sludge transportation and disposal. Overall, when the Master Project is completed, the division of capacity will be 27 mgd to Reno, 11.5 mgd to Sparks, and 1.5 mgd to whichever city serves Sun Valley. Using the approach proposed in the draft Facilities Plan, the allocation of project costs would be:

	Total ($)	Reno ($)	Sparks ($)	Sun Valley ($)
Cost to increase ESP facilities to 20 mgd capacity	3,320,000	(-1,660,000)	2,490,000	2,490,000
Cost to increase degree of treatment & for facilities common to 40 mgd of capacity	33,570,000	22,660,000	9,650,000	1,260,000
TOTAL COST	36,890,000	21,000,000	12,140,000	3,750,000

At the present time, it is believed that the entire Master Project is eligible for 85 percent federal funding and that the septage and sludge handling and disposal portions of the Master Project are eligible for 75 percent federal funding. On this basis, the allocation of capital costs for Alternative L-1, including sludge handling, would be:

	Project Cost in February 1979	Funds Needed in 1981-1983*
Federal	$30,609,500	$40,568,300
Reno	3,575,200	4,738,400
Sparks	2,066,800	2,739,200
Sun Valley	638,500	846,100
TOTAL	$36,890,000	$48,892,000

*Based on an annual escalation rate of 8 percent from February 1979 to October 1982.

Operation and maintenance costs would be divided between Reno and Sparks in proportion to the wastewater flow contributed. When Sun Valley is also contributing, an identical approach will be used to divide operation and maintenance costs between the three entities.

Impact Comparison of Alternatives Recommended by Reno-Sparks to Other Alternatives

The resolution of issues and the mitigation of adverse impacts directly relatable to the Master Project alternatives are within the purview of the EPA, DOI, NDEP, and the Cities of Reno and Sparks. Each alternative brings with it signification problems relative to gaining implementation. The situation of Alternative L-1, as recommended for implementation in the Draft Facilities Plan compared to other alternatives, is:

- L-1 is the least costly to Reno and Sparks for construction and for operation and maintenance. It should be noted that the estimated costs do not include the costs for mitigating the significant adverse impacts.

- Although L-1 removes the direct discharge of JWPCP effluent from the river, a significant nutrient and potential pollutant load is returned to the lower Truckee River via seepage and direct turnout from the Truckee Canal. The total nitrogen load may be greater than for AWT treatment and river disposal. Among the alternatives only land disposal at Dodge Flat completely removes the discharge of JWPCP effluent from the river, and even with this alternative there may be groundwater returns to the Truckee River. Nutrient loading is a significant issue to the Paiute Indian tribe, the DOI, the EPA, and others.

- The direct discharge of effluent to the Truckee Canal can account for up to 60 cfs or about 42,000 AFY of the TCID water allotment from the Truckee-Carson River system. This action may constitute a change in point of diversion and require a technical change in the TCID water permit. Water right changes are not required to implement AWT treatment and river disposal, but water rights of about 12,000 acre-feet may have to be acquired to implement land disposal.

- Both the Truckee Canal Alternative (L-1) and alternatives to dispose of the effluent at Dodge Flat (L-6 and L-7) could significantly reduce low flows in the river between Steamboat Creek and Derby Dam. A trade-off for the reduction in flow is improved water quality in this reach of river.

- Discharge to the Truckee Canal is expected to cause fish kills in the canal from ammonia, nitrite and possibly chlorine toxicity. The risk would be greatest at low dilutions. The Nevada Department of Wildlife wishes to retain the fishery potential of the canal. Neither of the other disposal alternatives would cause acutely toxic conditions in surface waters.

- The Town of Hazen draws a part of its untreated domestic water supply from the Truckee Canal. The direct discharge of JWPCP effluent to the canal raises the level of risk for human infection or contamination from drinking untreated canal water. A similar but lower risk occurs with river disposal near Vista. Land disposal at Dodge Flat on the other hand would significantly reduce the risk to Hazen residents as compared to other disposal options.

- Domestic water supply wells drawing from the shallow aquifer along the Truckee Canal are affected by water quality in the canal as well as percolating irrigation water. Relatively undiluted wastewater flowing in the canal and seeping into the groundwater may alter groundwater quality and increase the risk of chemical contamination of the domestic wells. Increased levels of nitrate would be expected and contamination from refractive organic chemicals is possible.

- Alternative L-1 would greatly increase the amount of algal-stimulating nutrients entering Lahontan Reservoir as compared to other alternatives. The increased load of nitrogen and other nutrients is expected to exacerbate water quality problems in the reservoir. Disposal to the Truckee River would significantly reduce the nutrient load while land disposal would remove the total load originating from the JWPCP.

- Disposal to the Truckee Canal offers significant protection to Pyramid Lake by reducing the JWPCP waste load reaching the lake without reducing water flows to the lake, if the problems associated with the potential to turn canal water and JWPCP effluent into the lower river are mitigated. Although water quality entering the lake with land disposal would be advantageous, the potential to diminish the amount of water entering Pyramid Lake may offset the advantage.

- The canal disposal alternative has the potential to affect the cui-ui by returning wastewater to the lower river. If this were done during treatment plant failure and at the time cui-ui are in the lower river, fish in the lower river could be harmed. The risk of catastrophic events seems low and is mitigatable. The lowering of river flow and potential effect on cui-ui spawning migrations and dispersal opportunities associated with the land disposal option are judged to cause a greater risk. AWT treatment with river disposal does not adversely affect the cui-ui relative to present conditions.

- If mitigatable adverse effects are corrected, opportunities for the recovery of Lahontan cutthroat trout and rainbow trout habitat in Truckee River seem to be improved most by Alternative L-1, because water and river sediment conditions would be significantly improved without impairing instream flow during critical seasons. Toxic conditions in the canal may cause the death of trout entering the canal.

Each of the three principal Master Project alternatives has significant advantages and disadvantages. The disposal of effluent to the Truckee Canal as recommended in the Facilities Plan may require the addition of physical solutions to mitigate significant adverse impacts. Several institutional arrangements would also be required, e.g., contracts between Reno-Sparks and TCID, a change in point of diversion of 60 cfs of water, water rights protections between Vista and Derby Dam, protection of the Hazen water supply, protection of groundwaters recharged by the canal, and changes in state water quality standards that protect beneficial uses in the canal and Lahontan Reservoir.

The implementation of land disposal to Dodge Flat requires the solution of complex water rights and river flow problems. Also, the manner in which the agricultural business is to operate is presently undefined.

ENVIRONMENTAL CONSIDERATIONS RELATIVE TO THE SELECTION OF THE RENO-SPARKS JWPCP MASTER PROJECT

OPERATIONS IMPACTS: LONG-TERM DIRECT AND SECONDARY EFFECTS OF WASTEWATER TREATMENT AND DISPOSAL

The Draft Facilities Plan prepared for Reno and Sparks by Kennedy/Jenks Engineers (1980) recommends the implementation of Alternative L-1, secondary treatment plus phosphorus removal and filtration with discharge to the Truckee Canal. Obviously, implementation of Alternative L-1 or any of the other alternatives results in major environmental resource, social, and economic trade-offs of importance to many interested agencies and parties. Comments on the Draft EIS and Draft Facilities Plan are expected to elucidate the significance and value of these trade-offs, and focus the governmental grant funding and regulatory process on the actions required to implement a project.

The alternative projects provide distinctly different sets of environmental, cost, and institutional conditions from which to select an implementable Master Project. The options to achieve similar goals are wide ranging and complex, creating benefits and detriments to numerous special interests. Consequently, the selection of a 40 mgd Master Project will require natural resource and economic trade-offs that are unique to the Truckee-Carson River basins. Potential mitigations for significantly adverse impacts are also identified. Mitigations leading to generally acceptable trade-offs depend on many decisions outside the purview of the EPA. Moreover, many of the required decisions are presently clouded by litigation and local customs.

The principal impacts of the Master Project, in common and as distinct alternatives, are summarized for comparative purposes in Table 3. The wastewater treatment and disposal alternative that seems to best resolve each stated issue for a resource category is also given in the table. The alternatives were selected to respond differently to the major issues, and of course, none provides a clearcut resolution to even a majority of these issues.

Impacts Common to the Master Project

The Draft EIS is a response to the recommended project and major alternatives to that project. There are a number of significant environmental resource and socio-economic impacts common to the increase in wastewater treatment and disposal capacity from 30-40 mgd. For example, urban and

Preceding page blank

Table 3. Summary Comparison of the Environmental Consequences of Alternative Reno-Sparks JWPCP Master Project

Resource Issue and Category of Effect	Impacts Common to Master Project Alternatives	Significant Impacts of Advanced Wastewater Treatment (AWT) and Truckee River Disposal	Significant Impacts of Secondary Treatment Plant-Land Disposal at Dodge Flat	Significant Impacts of Secondary Plant with Phorphorus Removal and Filtration-Discharge to Truckee Canal	Master Project Alternative with Beneficial or Minimum Adverse Effects
SURFACE WATER HYDROLOGY					
Effects on river flow downstream of Steamboat Creek	Urban growth and the conversion of irrigated agricultural land to urban uses could potentially reduce the annual river discharge by 0 to 5 percent	Except for secondary growth effect common to all alternatives there is no effect	Reduces annual river discharge at Vista by 8 percent Could reduce low Q_{10} monthly instream flows at Vista up to 65 percent depending on river operation criteria	Reduces annual river discharge at Vista by 8 percent Reduces low Q_{10} monthly instream flows at Vista up to 28 percent depending on river operations criteria	AWT with Truckee River disposal
Effects on flows passing Derby Dam to the lower Truckee River	Same as above	Same as above	Reduces annual average discharge past the dam by 8 percent and reduces low Q_{10} flows by up to 65 percent	Same as above	AWT with Truckee River disposal
Effects on Truckee River discharge to Pyramid Lake	Same as above	Same as above	Reduces annual average discharge to the lake by 9 percent. Could reduce average monthly low Q_{10} flows up to 73 percent	Would not change annual inflow to Pyramid Lake but average monthly low Q_{10} flows could be reduced up to 16 percent. Average monthly flows can increase or decrease depending on river operations from reservoir storage.	AWT with Truckee River disposal
Effects on Newlands Project water demand shortages	No estimated effect	No estimated effect	This option is estimated to increase agricultural demand shortages by 66-71 percent over the river disposal option	Reduces the risk of agricultural water demand shortages in the Newlands Project	Secondary treatment with phosphorus removal and filtration, and Truckee Canal disposal
Effects on inflow to Lahontan Reservoir	No estimated effect	No estimated effect	Could reduce amount of flow entering the reservoir but depends on river operations schedule	Produces up to 60 cfs inflow into reservoir during nonirrigation season	Secondary treatment with phosphorus removal and filtration, and Truckee Canal disposal
Effects on amount of water reaching Stillwater Wildlife Management Area	No estimated effect	No estimated effect	Estimated to reduce spillage from Lahontan Reservoir by 2-4 percent	Estimated to increase spills from Lahontan Reservoir by 20 percent	Secondary treatment with phosphorus removal and filtration, and Truckee Canal disposal
SURFACE WATER QUALITY					
Abatement of acutely toxic conditions in the Truckee River caused by the JWPCP	All Master Project alternatives remove or abate acutely toxic conditions caused by the JWPCP	At normal JWPCP operations and at river flows exceeding the low Q_{10} conditions acute toxicity is not expected to occur	The JWPCP effluent does not enter the river	Toxic conditions could occur below Derby Dam during treatment plant failures if effluent is released from the canal into the lower river	Secondary treatment and land disposal at Dodge Flat
Abatement of excessive eutrophication of the Truckee River and Truckee Canal	All Master Project alternatives reduce or remove the JWPCP nutriant load	The average daily total nitrogen load is reduced to river by 43 percent and to canal by 42-75 percent. The average daily total phosphorus load is increased to the river by 14 percent	The nutrient load from JWPCP does not directly enter the river; however, some nutrients may enter the river via groundwater accretions downstream of Wadsworth	The JWPCP nutrient load would be removed from the river between Vista and Derby Dam. The total nitrogen load below Derby Dam would be reduced by 22-43 percent. The total phosphorus load below Derby Dam would decrease by 34 percent The total nitrogen load in the Truckee Canal would increase by 122-146 percent The total phosphorus load in the canal would increase by 60-96 percent The Truckee Canal is expected to show symptoms of excessive nutriant enrichment	Secondary treatment and land disposal at Dodge Flat
Effects on dissolved oxygen (DO) in the river between Vista and Derby Dam	All Master Project alternatives reduce substances in the river that could cause depressions in DO	Oxygen consuming BOD and ammonia loads in the river are reduced Algal growth is reduced which in turn reduces the respiratory demand for DO	The BOD and COD load from the JWPCP is removed from the river	The BOD and COD load from the JWPCP is removed from the river between Vista and Derby Dam BOD and COD may be returned to the lower river The BOD load on the Truckee Canal will average 1.09-1.17 mg/l An oxygen sag is expected to occur in the Truckee Canal	Secondary treatment and land disposal at Dodge Flat

Resource Issue and Category of Effect	Impacts Common to Master Project Alternatives	Significant Impacts of Advanced Wastewater Treatment (AWT) and Truckee River Disposal	Significant Impacts of Secondary Treatment Plant-Land Disposal at Dodge Flat	Significant Impacts of Secondary Plant with Phorphorus Removal and Filtration-Discharge to Truckee Canal	Master Project Alternative with Beneficial or Minimum Adverse Effects
Effects on chronic toxicity in the river and Truckee Canal	All Master Project alternatives remove or abate chronic toxicity in the river or canal. Nonpoint sources containing potential toxicants are not affected	Through treatment, choice of points of discharge, dilution and the assimilative capacity of the river, potential toxicants in the effluent are reduced to levels that are considered safe for fish as prescribed by the water quality standards There remains a risk for chronic toxicity to occur	The JWPCP which contains toxic substances will not be discharged to the river or canal An undefined level of risk for chronic toxicity to occur in the river will be present from other wastewater discharge sources	Toxic substances in the JWPCP effluent would not enter the river upstream of Derby Dam Toxic substances may enter the lower river by seepage and diversion from the Truckee Canal The level of risk for chronic toxicity to occur in the canal would be high	Secondary treatment and land disposal at Dodge Flat
Effects on bottom sediment characteristics in the river and Truckee Canal	Urban growth and construction is expected to increase the sediment load discharged to the river with surface runoff	Biological growth stimulated by nutrients cause sediments to have a greater content of organic material, higher BOD and lower interstitial DO	The organic component in bottom sediments would be reduced and average interstitial concentrations of DO would rise	Bottom sediments in the canal would have higher BOD and lower DO concentrations	Secondary treatment and land disposal to Dodge Flat
Effects on water temperature in the Truckee River	No common definitive effect	The JWPCP effluent is warmer than the river and may raise the river temperature in the mixing zone by about 1 to 2°C	No direct effect The secondary effect of reducing instream flow may also raise temperature in the warm season	Effect of pipeline conveyance on effluent temperature is undefined. Thus, the effect on temperature in the canal is not projected	Secondary treatment and land disposal to Dodge Flat
Effects on drinking water quality in the river and canal	Effects are specific to alternative	Improved chlorination and effluent filtration is expected to lower risk of infection. Increase in effluent volume may increase risk of chemical contamination	Sewage effluent would be removed from the river and significantly lower the risk of using the river as a treated drinking water supply	Although the river below Derby Dam would improve as a potential drinking water supply, the lower river would retain a high risk for periodic contamination, and the Truckee Canal would be significantly degraded	Secondary treatment and land disposal to Dodge Flat
Effects on water quality in Pyramid Lake	Urbanization is expected to increase the associated nonpoint source load of biologically active agents entering the lake. The impacts are undefined Decreased agriculture is expected to reduce the volume of irrigation return water and associated loads of salts, nutrients and suspended solids	At the time of conversion from the 30 mgd ESP to the Master Project the total nitrogen load could be reduced by 43 percent which could rise to a 16 percent reduction at 40 mgd. Reductions in nitrogen load are expected to cause the lake to continue to be nitrogen limited. Waste constituents not targeted for removal will increase in proportion to effluent volume	The total nitrogen load could be reduced by as much as 63 percent. The array of waste constituents associated with the JWPCP effluent would not enter the lake except for the groundwater return from Dodge Flat	The total nitrogen load could be reduced by 38 percent depending on how much is released from the canal to the lower river. A significant reduction in waste constituent loading would result.	Secondary treatment and land disposal to Dodge Flat
Effects on water quality in Lahontan Reservoir	Similar to above	The total nitrogen load could initially be decreased by 77 percent which diminishes to 45 percent at 40 mgd. The total phosphorus load could be reduced by as much as 95 percent from the present. The reservoir should be nitrogen limited	The total nutrient load would be reduced to the river base load. Reductions of 85-62 percent in total nitrogen and 97-93 percent in total phosphorus loads are expected to improve opportunities for beneficial uses impaired by excessive eutrophication	The total nitrogen load could increase over the present by 100-159 percent. There would be a significant decrease in phosphorus load from the JWPCP but phosphorus stored in the reservoir and entering with Carson River water may cause the increased nitrogen load to present excessive algal blooms to greater levels of unacceptability	Secondary treatment and land disposal to Dodge Flat
Effects on water quality downstream of Lahontan Reservoir	No significant effect expected	No significant effect expected	No significant effect expected	Depending on canal and reservoir operations there could be signi- effects	Secondary treatment and land disposal to Dodge Flat

Resource Issue and Category of Effect	Impacts Common to Master Project Alternatives	Significant Impacts of Advanced Wastewater Treatment (AWT) and Truckee River Disposal	Significant Impacts of Secondary Treatment Plant-Land Disposal at Dodge Flat	Significant Impacts of Secondary Plant with Phorphorus Removal and Filtration-Discharge to Truckee Canal	Master Project Alternative with Beneficial or Minimum Adverse Effects
FISH AND WILDLIFE HABITAT					
Effects on fish habitat and fisheries between Vista and Derby Dam	Improve habitat and increase fishery potential	Abate acute and chronic toxicity Reduce algal growths Increase number of species of invertebrates Reduce DO sag in water and bottom sediments Support sport fish and a fishery	Remove JWPCP effluent from the river Reduce instream flow with potential significant impact on autumn and winter spawning fish Fish and aquatic invertebrate habitat similar in quality to that above Steamboat Creek Support sport fish and a recreational fishery	Similar to land disposal at Dodge Flat	Secondary treatment with land disposal at Dodge Flat or secondary treatment with phosphorus removal and filtration, and Truckee Canal disposal
Effects on fish habitat and fisheries between Derby Dam and Pyramid Lake	Same as above, plus Potential for a slightly lower instream flow due to urban growth	Similar to above	Similar to above, plus Potential for significantly lower average instream flows Potential incremental loss in cui-ui spawning and dispersion habitat Potential impairment of fish access to river from Pyramid Lake	Significantly reduces amount of JWPCP effluent entering the lower river Reduces algal growth Increases diversity of invertebrate species Moderate fluctuations in DO and pH Reduces organic content in bottom sediments Potential to change instream flow both beneficially and/or adversely	Secondary treatment with phosphorus removal and filtration, and Truckee Canal disposal
Effects on fish habitat and fisheries in Pyramid Lake	Potential to reduce inflow into lake and contribute to lowering of lake	Stabilization of eutrophication of lake Reduces total nitrogen and total phosphorus loading to lake Potential to increase load of salts and other solutes not removed by treatment process	Removes nutrient and other potential pollutants of JWPCP origin Lower average primary productivity Potential to improve DO concentrations in deep water Increase clarity of water Reduces salt load Reduces annual inflow of water by an average of 9 percent Contributes to lowering of the lake	Reduces nutrient and other potential pollutant load on the lake Maintains or lowers primary productivity in the lake Reduces salt load to the lake	Secondary treatment with phosphorus removal and filtration, and Truckee Canal disposal
Effects on fish habitat and fisheries in Truckee Canal	No effects identified	Reduce algal growth potential Reduce public health risk	Significantly reduces algal growth potential Significantly reduces public health risk Improves opportunity for recreational fishery	Cause acute and chronic toxic conditions for fish Cause excessive algal and other microorganism growth High risk for contamination of fish flesh Reduce species diversity	Secondary treatment with land disposal at Dodge Flat
Effects on fish habitat and fisheries in Lahontan Reservoir	No identified effect	Reduces nutrient load from JWPCP Potential to reduce algal growth Slow down eutrophication process	Significantly reduces nutrient and other pollutant load Reduce algal growth and perhaps raise DO in hypolimnion Improve aesthetics Improve fishery	Significantly increase nitrogen load which is judged to cause greater algal growth related problems Potential to cause toxic conditions near dam Adversely affect sport fish and fishing Impair aesthetics of recreational fishing	Secondary treatment and land disposal at Dodge Flat
Effects on endangered fish - cui-ui	Secondary growth effects of lowering instream flow and increasing nonpoint source pollutant load	Improves fish habitat in lower river Reduces JWPCP impact on Pyramid Lake	Significantly improves water quality in lower river Diminishes instream flow in lower river Potential to increase problem of spawning areas from lake to river Reduces quantity of river habitat Contributes to lowering of lake	Potential for catastrophic effects if JWPCP treatment fails and effluent is released from canal to lower river	Secondary treatment with phosphorus removal and filtration, and Truckee Canal disposal

Resource Issue and Category of Effect	Impacts Common to Master Project Alternatives	Significant Impacts of Advanced Wastewater Treatment (AWT) and Truckee River Disposal	Significant Impacts of Secondary Treatment Plant-Land Disposal at Dodge Flat	Significant Impacts of Secondary Plant with Phorphorus Removal and Filtration-Discharge to Truckee Canal	Master Project Alternative with Beneficial or Minimum Adverse Effects
Effects on threatened fish - Lahontan cutthroat trout	Same as above	Improves year-round habitat in Truckee River Improves spawning gravel quality Allow passage during coolwater season	Removes water quality effects of JWPCP between Vista and Pyramid Lake Reduces low Q_{10} instream flows and causes loss of flow related habitat Impairs passage from lake to above Vista	Causes toxic conditions for fish entering the canal Same as land disposal for habitat conditions from Vista to Derby Dam Potential for catastrophic event in lower river if JWPCP fails	Secondary treatment with phosphorus removal and filtration, and Truckee Canal disposal
Effects on wildlife	Secondary growth effects of converting wild and agricultural lands to urban and project uses	Potential loss of riparian habitat at outfall locations	Loss of 4,200 acres of native habitat Potential loss of riparian habitat along river	Potential loss of riparian habitat along river	AWT with Truckee River disposal
GROUNDWATER					
Effects on groundwater quality	No common effects	No significant effect expected	Excess irrigation will recharge groundwater, increase nitrates, leach salts from lake bed, eventually trigger poor quality return flows to Truckee River Quality degradation of Wadsworth area wells, and in wells near Fernley drain Rapid infiltration will lead to return flows to Truckee River within 10 years, returning JWPCP pollutants to river and Pyramid Lake	Percolation from canal to groundwater will degrade wells increasing nitrate levels and other constituents	AWT with Truckee River disposal
WATER SUPPLY					
Effects on water supply for M&I use	No common effects	Continuation of discharge of effluent to Truckee River and Truckee Canal, which is used as a direct water supply in Hazen, and an indirect supply from wells in Wadsworth, Fernley and Fallon	May contaminate wells used for domestic purposes in Wadsworth and near Fernley drain	Will degrade water supply for Hazen, and may degrade groundwater used for water supply in Fernley and Fallon	AWT with Truckee River disposal
PUBLIC HEALTH					
Effects on public health risks	Small risk of public exposure to pathogens from sewage treatment plant	Small risk of public exposure to pathogens from discharge to river	Risk of contact with aerosol particles from spray irrigation at Dodge Flat Risk of well contamination at Wadsworth from irrigation, rapid infiltration and Fernley drain discharge	Risk of contact with effluent in Truckee Canal, in Hazen's untreated water supply, in Lahontan Reservoir, and in lateral canals and reservoirs. Risk of well contamination near canal	AWT with Truckee River disposal
CULTURAL RESOURCES					
Effects on historic and archeological resources	No common effects	Disturbance of several sites on outfall alignment, depending on location	Disturbance of several sites on outfall alignment and loss of numerous sites at Dodge Flat. Site significance not determined	Disturbance of several sites on outfall alignment	AWT with Truckee River disposal
SOCIO-ECONOMICS					
Effects of growth on Truckee Meadows	Decreased agricultural acreage, decreased groundwater recharge, increased surface water diversions; increased demands on urban services; impaired ability to meet air quality standards; and other factors	All effects are common	All effects are common	All effects are common	No difference

Resource Issue and Category of Effect	Impacts Common to Master Project Alternatives	Significant Impacts of Advanced Wastewater Treatment (AWT) and Truckee River Disposal	Significant Impacts of Secondary Treatment Plant-Land Disposal at Dodge Flat	Significant Impacts of Secondary Plant with Phorphorus Removal and Filtration-Discharge to Truckee Canal	Master Project Alternative with Beneficial or Minimum Adverse Effects
COST					
Effect on monthly sewer service charges	Increased costs	From $2-$7 per month cost increase	From $2-$7 per month cost increase	About $2 per month cost increase	Secondary treatment with phosphorus removal and filtration, and Truckee Canal disposal
LAND USE					
Effect of alternatives on land use	No common effects	No significant effect expected	Change in use of 4,200 acres at disposal site, and 640 acres at rapid infiltration site, plus minor impacts along outfall pipeline	No significant effect expected, except minor impacts along outfall	AWT with Truckee River disposal
ENERGY					
Relative energy consumption	Impacts are specific to alternative	Energy intensive treatment process	Energy intensive disposal method	Lowest energy use	Secondary treatment with phosphorus removal and filtration, and Truckee Canal disposal

recreational growth increase traffic, which increases air pollutant emissions, which could increase the frequency of violations of air quality standards established to protect public health. The EPA, the state, and local government are involved in a program to mitigate the emissions of air pollutants to reduce the frequency of air quality violations. The current Air Quality Maintenance Plan does not account for the total growth that may be accommodated by the Master Project.

Other areas of secondary impact related to growth are the conversion of potentially prime agricultural land to urban land uses, overdraft of groundwater resources, conversion of agricultural water uses to urban water uses, increase in the nonpoint source production of water pollutants which may enter surface or groundwaters, and greater demand for utility and social services. There are programs and regulatory processes in place that are separate from the Master Project with the responsibility and authority to mitigate the impacts of growth. The scopes and efficiencies of these programs are not the subject of this Draft EIS.

Common Advantages

The Master Project will allow Reno, Sparks, and some adjacent areas to grow unimpeded by limitations of capacity to treat and dispose of sewage. The population presently being served by the JWPCP is about 155,000. New residential and commercial project development is not occurring because it is very difficult to acquire an allowable wastewater treatment and disposal opportunity, either through hook-up to the JWPCP, privately owned treatment plant, or individual systems such as septic tanks. Completion and operation of the 30 mgd ESP will relieve this impediment to growth until its capacity is reached in about 1985. At the present level of per capita sewage generation, the ESP will accommodate a population of about 226,000. Implementation of the Master Project before the ESP reaches its design capacity can prevent sewerage from becoming a significant limiting factor in the area's economic development. The 40 mgd Master Project would then accommodate a population of about 308,000 which may occur in about 1996. If an effective urban water conservation program is implemented, as may occur through the water conservation program required by EPA as a grant condition for the ESP, the populations accommodated by the plant could be 10-30 percent greater.

In addition to sewerage capacity certain other benefits may accrue to the community.

- Disruptive competition for the available sewage capacity is avoided.

- Sewage services can be provided on a prompt and equitable basis.

- Small and potentially less effective and efficient package or satellite wastewater treatment systems can be incorporated into the Master Project.

- Opportunities for the regional 208 planning agency to work more closely with city and county governments are enhanced.

- The development or annexation of sewer service areas may occur in a more orderly and cost-effective manner.

All of these benefits can induce local decision making activity to focus on other problems requiring remedial action.

There are local and federal costs to be paid for in the Master Project. Although local costs vary with treatment and disposal options, there is the benefit of 75-85 percent federal funding. Considering a possible capital construction cost in excess of 50 million dollars, the federal grant stemming from Section 201 of the Clean Water Act can be a substantial local benefit. Expenditures for materials and labor will significantly affect local economics during the period of construction. Employment and the purchase of equipment, materials, and supplies will increase significantly.

All treatment and disposal options reduce the total pollutant load entering the river in comparison to current conditions (see Table 4). Concentrations of pollutants should be decreased compared to conditions represented in the PEL (1979) report. Whichever Master Project treatment and disposal option is finally implemented will reduce the average daily load of potential pollutants discharged to the river from the JWPCP. Generally, improvement in the quality of the river is expected, with the greatest river quality benefit being derived from either land (Alternatives L-6 and L-7) or canal (Alternative L-1) disposal, substantially improving compliance with water quality standards for the Truckee River.

The abatement of pollution in the Truckee River is expected to improve the public's view about the value of the river, a natural resource that offers multiple use opportunities. If the river is generally perceived as clean rather than polluted, public support for developments that fully use the instream qualities of the resource seems more realizable.

Improvements will occur in the aquatic habitat and fishery downstream of Steamboat Creek although the magnitude of improvement would be different for each alternative. These improvements to the river are of the following nature:

Table 4. Summary Characterization of Environmental Conditions in Truckee River Reaches, Pyramid Lake and Lahontan Reservoir

Truckee River Reach	Constituents of Concern								Additional Comments
	Dissolved Oxygen (DO)	Biochemical Oxygen Demand (BOD)	Nitrogen	Phosphorus	Periphyton	Total Dissolved Solids (TDS)	Temperature	Toxicants	
Lake Tahoe to Stateline	Saturated	Less than 2 mg/l	Slightly elevated nitrogen from springs. Slightly increased nitrate concentrations in the Truckee River below Lake Tahoe. Low overall nitrogen concentrations.	Low	Low	Low	Coldwater habitat	None reported	Municipal effluents to river are from former land disposal of secondarily treated wastewater and from present AWT plant at Truckee.
Stateline to above Steamboat Creek	Usually a gradual decrease in DO from about 10 mg/l to about 8 mg/l.	Relatively low BOD. Slight increase from 2 to 4 mg/l.	Nitrate concentration is usually less than 0.5 mg/l. Ammonia and nitrite concentrations are relatively low.	Total phosphorus concentration ranges from 0.02 to 0.08 mg/l along this reach. Orthophosphate is variable and relatively low.	Periphyton biomass is moderate (1.0 to 5.0 gm/m^2) along this reach.	Usually a steady increase in TDS from 150 to 200 mg/l.	Water temperature increases gradually due to the warmer climate and lower elevation. Coldwater habitat.	None reported	No direct municipal sewage discharges. Receives nonpoint discharge of wastewaters and urban runoff.
Steamboat Creek to Vista	DO can decrease rapidly in this reach. DO concentrations may be 6 mg/l in August with lower concentrations occurring.	BOD reaches its maximum, and may be 15 mg/l in December.	Rapid increase of total nitrogen, nitrite and ammonia to their peak concentrations. Nitrate concentration remains relatively low.	Total phosphorus and orthophosphate reach their highest concentrations.	Both biomass and algae abundance increase rapidly.	Generally a rapid increase in TDS to 300 mg/l.	Dramatic increase followed by a decrease. Warmwater habitat during some summers.	Toxic conditions occur because of excessive concentrations of residual chlorine, ammonia, nitrite, nitrate, and zinc.	Pacific Environmental Laboratory reported toxicity in this reach of Truckee River. Additions of nitrogen and phosphorus stimulate algal growth.
Vista to Derby Dam	DO remains relatively constant at moderate (9 mg/l) to supersaturation concentrations (11 mg/l).	BOD remains relatively constant at moderate levels.	Total nitrogen, ammonia, and nitrite concentrations remain relately high. Nitrate peaks in this reach (e.g., nitrate reached 21 mg/l in October 1977).	Total phosphorus and orthophosphate remain relatively high.	Biomass and abundance of periphyton peak in this reach.	TDS increase or are relatively constant at moderate concentrations along this reach.	Water temperature remains relatively constant at moderate warm levels in summer.	Ammonia and nitrate toxicity may occur in this reach.	Nonpoint source runoff originates from a small amount of agriculture and on-site waste disposal, watershed erosion, and Interstate 80.
Derby Dam to Pyramid Lake	DO varies along this reach, but usually DO decreases between Derby Dam and Pyramid Lake.	BOD remains relatively constant or decreases along this reach.	All nitrogen constituents decrease in this reach. Nitrate, ammonia, and nitrite concentrations are lowest where the Truckee River enters Pyramid Lake.	Both total phosphorus and orthophosphate tend to decrease approaching Pyramid Lake.	Usually, both biomass and abundance of periphyton decrease between Derby Dam and Pyramid Lake.	Overall increase in TDS to the highest concentrations (400 to 500 mg/l) at Pyramid Lake.	Overall, water temperature increases between Derby Dam and Pyramid Lake. Warmwater habitat in summer months.	None reported	Nonpoint source pollutants of this reach are from agriculture, waste disposal systems, and soil salts which enter the river as runoff.
Pyramid Lake	DO usually ranges from 5 mg/l in bottom waters to 11 mg/l at the surface.		Nitrate levels are stratified in summer. Inorganic ammonia ranged from less than 0.01 to 0.07 mg/l. Nitrite concentrations were highest in the winter (1976).	Orthophosphate concentration ranged from 0.10 to 0.07 mg/l in 1976. Orthophosphate concentrations are stratified. Surface water total phosphate varied from 0.11 to 0.08 mg/l.	Primary productivity: the majority of primary production within the lake occurs as Nodularia blooms during June to September (Galat, et al., 1977).	TDS ranged from 4,985 to 5,385 mg/l and averaged 5,235 mg/l in 1976. Sodium cloride is the major constituent.	Water temperature range from 0.6°C to 25.5°C.	None reported	The pH of Pyramid Lake ranged from 9.0 to 9.4 in 1976. Nitrogen is considered the limiting algal growth factor. The native cui-ui is found only in Pyramid Lake.
Truckee Canal	Near saturation.	The BOD at Fernley was reported as 2.7 mg/l.	Ammonia concentration is less than the value in the Truckee River at Clark. Nitrate concentration is higher, and total nitrogen is slightly higher in the canal compared to the Truckee River at Clark.	The present total phosphorus load at the terminus of the Truckee Canal is 468 pounds per day. Dissolved orthophosphate concentration above Lahontan Dam, in 1975 was 0.16 mg/l.		The TDS from Derby Dam to above Lahontan Dam ranged from 145 to 228 mg/l.	Temperatures range from 22 to 6°C during October 1977 to August 1978.	Zinc concentration at Fernley is reported as 0.025 mg/l	The pH of the Truckee Canal varies from 7.2 to to 8.7. As nitrogen is in excess in the Truckee Canal, phosphorus levels are the limiting factors
Lahontan Reservoir	DO ranged from 5 to 10 mg/l during March 1975 to November 1975 (CRBCOG, 1978).		Total kjeldahl nitrogen ranged from 0.2 to 0.5 mg/l from March to November 1975. Ammonia concentrations were 0.01 to 0.03 mg/l in the spring and fall of 1975 and 0.05 to 0.10 mg/l in the summer of 1975.	In March 1975, total phosphorus remained relatively constant at 0.18 mg/l. During July 1975, total phosphorus varied from 0.14 to 0.28 mg/l.		TDS ranged from 183 mg/l in June 1967 to 108 mg/l in October 1975.	Water temperature varied from 8 to 24°C during fall and summer of 1975.	None reported.	The contribution of Truckee River water to Lahontan Reservoir varies with the water year. Dissolved phosphate concentration categorizes Lahontan Reservoir as eutrophic, Nitrate is considered the limiting nutrient.

- Remove toxic conditions.
- Reduce turbidity and suspended materials.
- Reduce growths on rocks and organic materials that accumulate in quiet water.
- Raise concentrations of dissolved oxygen in the water and bottom sediments.
- Produce a wider variety of aquatic insects that in turn support a greater variety of fishes.
- Improve fishing for sport fish including brown and rainbow trout.
- Improve water quality for the endangered cui-ui and threatened Lahontan cutthroat trout.

Filtration and improved disinfection of the effluent or removal of the effluent from the river increases the potential for use of the river as a domestic water supply.

Common Disadvantages

Groundwater. Growth in the Truckee Meadows will increase demand for water to supply urban needs. SPPCo, as the major water purveyor, will seek to meet those demands from surface as well as groundwater. The groundwater source is most likely to be constrained to no more than present extraction levels by quality constraints.

As urban land uses replace agricultural irrigation and basin recharge decreases, this safe pumping amount is likely to decrease. This will require greater dependence on surface water, with groundwater use probably phased so as to maximize groundwater pumping during times of the year when sufficient surface water is not available to SPPCo for meeting M&I uses, then using surface water totally when it is available.

Thus, growth in the Truckee Meadows may decrease the annual yield of groundwater available for potable use in the Truckee Meadows.

Water Supply. The secondary effects of the growth accommodated by the plant will increase water supply demands and require that a greater proportion of demands be met with surface water rather than groundwater. SPPCo and other purveyors will need to obtain rights to surface water. In addition, SPPCo will probably need to obtain storage rights in upstream reservoirs so that the M&I water can be provided at times of demand.

The analyses in this EIS assume that lack of adequate water supply will not be a significant constraint on growth.

The hydrologic analysis evaluated the effects of urban growth and increased water use on Truckee River flows. These analyses showed that the expansion of 40 mgd could decrease average annual flows in the Truckee River by up to 5 percent if Orr Ditch Decree criteria are used to model agricultural diversions in the Truckee Meadows.

Water Conservation. Water conservation has been practiced in Reno during drought periods with some success. While the water system is largely unmetered (commercial and industrial users are now having meters installed), public response to a perceived water shortage was excellent.

EPA has imposed a grant condition on Reno and Sparks as part of the ESP to develop a water conservation program. If this grant condition is met, per capita water use would be reduced below the levels assumed in the hydrologic analyses. However, information submitted to EPA to date does not indicate any quantitative measures of whether the condition will be met. Water conservation would enable the 40 mgd plant to support a larger population, probably as much as 20-30 percent greater than without conservation.

Land Use. The growth of the Reno-Sparks area supported by the Master Project will change the use of land in the Truckee Meadows. Much of this development will occur on lands that have been irrigated in the past and have irrigation water rights; however, some projects have been constructed in dry areas.

Prime Agricultural Lands. The implementation of the JWPCP may allow the irreversible loss of prime agricultural lands in the Truckee Meadows. Although currently no lands in the projected service area have been designated as prime agricultural lands, there may be a need to develop a mitigation plan in the future.

Socio-Economic Impacts. The expanded treatment capacity of the Reno-Sparks JWPCP Master Project will allow for economic and population growth in the service area. This growth, which is the socio-economic impact of the project, will have further effects on Truckee Meadows which stem from its physical presence and its interaction with other systems. Its physical presence will include the conversion of land into urban uses - houses, shops, and warehouses or factories - and the resulting expansion or intensification of the urbanized area. Its interaction with other systems will include increased demand on water supply, potential increase in the generation of air pollutants, deterioration of water quality and additional traffic on major streets and thoroughfares. Social services such as school capacity, police and fire protection, hospitals, social welfare, etc., will have to be increased.

Paying for Growth. While much of the cost of the wastewater treatment project is proposed for federal funding, the cost of other public services provided locally must generally be defrayed by local funds. In theory, if the current population of about 150,000 can pay for the current facilities and services provided for them, it follows that an added 150,000 people should be able to contribute to the same degree to paying for services and facilities needed to serve them.

A number of factors suggest, however, that public facilities and services are becoming both more costly and more difficult to finance as time goes on. Among these may be mentioned the fact that interest rates (important in the financing of capital facilities) are much higher now than they were when Washoe County's current growth spurt began, meaning that it will become increasingly costly to expand the physical plant of the two cities. Further, public services in general have become more expensive over time as inflation has eroded the purchasing power of the dollar. Another factor is the relatively low wage schedule prevailing in Washoe County, which is bound to cause taxpayer resistance to increases in public costs. Finally, tax and spending limitation measures will increasingly make it difficult for local governments to expend public funds to extend essential services to growing areas.

This combination of factors raises important questions about how local jurisdictions can pay for the multitude of public services a doubling of population implies. The population growth itself poses a significant change to the region, and the provision and financing of adequate urban services to that new population is also a significant issue arising from the wastewater project.

Cost and Funding. The JWPCP Master Project alternatives are estimated to cost between $25,000,000 and $59,000,000 to construct, excluding sludge handling. Annual O&M costs vary between alternatives and over the long-term comprise a significant portion of total project cost.

If the local costs are spread among a 1979 population of 150,000 in the Truckee Meadows, the per capita share of the construction cost would be about $326, minus the portion paid by business and industry. Since the City of Reno plans to issue 20-year bonds, the per capita cost including bond repayments and O&M would be about $7.65 per year, minus the portion paid by commercial and industrial users. Given an average density of three persons per household, the City of Reno would have to increase sewerage charges by about $2 per month per household to pay for all local construction and O&M costs of Alternative L-1.

Alternative T-9 at 75 percent funding could increase household sewerage costs by as much as $7 per month less the portion borne by business and industry. The other alternatives would be within the $2-$7 per month range.

In Reno, these additional costs could be obtained from ad valorem taxes, general revenue and sewer service charges. In Sparks, it is expected that the city will recover its local costs of project construction through sewer connection fees, both past and future. O&M charges would be funded from sewer use charges. Sparks expects that an increasing population will yield sufficient new revenue to fund O&M expenses without rate increases (Kennedy/Jenks Engineers, 1980).

Institutional Constraints. Water rights and Truckee River flows could be affected by two of the wastewater disposal alternatives proposed for the Master Project.

The outcomes of pending litigations, if different from the existing operating criteria for the Truckee River, could affect the resolution of water rights problems associated with the Dodge Flat or Truckee Canal alternatives.

Package Plants. At any time when capacity of JWPCP is not readily available to a developing area, either through lack of available plant capacity or through lack of interceptor capacity, package plants may become the most feasible way in which a growing area can be sewered. Such plants have been constructed in the Truckee Meadows when capacity was not available in the JWPCP, and may be proposed in similar conditions in the future. Furthermore, the Facilities Plan (Kennedy/Jenks Engineers, 1980) indicates that package plants with wastewater reuse will probably provide waste treatment and disposal after the 40 mgd capacity is reached. A failure to construct the Master Project expansion to 40 mgd or higher will therefore not necessarily mean a cessation of growth.

Air Quality. Growth accommodated by the Master Project has the potential to adversely impact the air quality of the Truckee Meadows air basin through increases in pollutant emissions from various sources.

In summary, if population growth remains at a 3.76 percent annual rate or below, it does not appear that the Master Project will interfere with the timely attainment of NAAQS, nor does it appear that the Master Project will interfere with the maintenance of NAAQS. However, there are no assurances that the Master Project capacity will not enable more rapid growth. If such growth is allowed, maintenance of NAAQS will be jeopardized.

Mitigation of Common Impacts

- Potential for water shortages due to increased water demand from growth.

  Shortages can be prevented by the water purveyor, SPPCo, acquiring sufficient water rights and managing ground and surface waters in a conjunctive way.

  Shortages can also be mitigated through conservation. The most effective way to enforce conservation is through metering of all water use, combined with usage rates that impose economic penalties on heavy use.

- Decreased groundwater yield due to reduced recharge from agricultural irrigation displaced by urban growth.

  This impact could be partly mitigated through a groundwater recharge program.

- Potential small decreases in Truckee River flows due to growth.

  The slight decreases in annual and low Q_{10} flow that could occur due to growth could be mitigated by reducing consumptive losses in the basin and by revising river management criteria.

- Air quality may be degraded and progress toward attaining standards impaired.

  Local growth management and air quality management planning can mitigate these impacts. Stricter controls and/or slower growth may be needed to successfully mitigate this impact.

- Plant failure could pose a serious threat to water quality.

  Failures can be minimized by providing backup power systems, installing inplant warning systems, and providing an emergency storage lagoon on-site.

Impacts of Truckee Canal Disposal (Alternative L-1)

The facilities needed to implement Truckee Canal disposal include expansion of the 30 mgd ESP capacity to 40 mgd, gravity flow filtration, and a flow equalization basin. Dechlorination of the effluent would be discontinued. The treated effluent would be conveyed by gravity pipeline about 18 miles to the point of discharge into the Truckee Canal. Sludge would be piped to Spanish Springs Valley and disposed of by spreading on the land.

Advantages

The Truckee Canal disposal alternative has certain beneficial and adverse effects. In many ways the benefits identified for the Dodge Flat land disposal option also apply to the Truckee Canal diversion alternative (L-1). Treated wastewater discharged directly to the canal could, to some degree, replace river water now diverted to the canal, releasing river water for other beneficial uses. Effluent discharged to the canal would be mixed into river water and used for crop irrigation. JWPCP effluent would not be discharged directly to the Truckee River, bringing about habitat and water quality improvements similar to those provided by the Dodge Flat alternative. Moreover, TCID would be assured of receiving initially 31,500 acre-feet per year of water which would rise to 42,000 acre-feet per year in the next 20 years. This alternative does not increase the risk for M&I deficits and reduces the risk of Newlands Project deficits.

This alternative was recommended for implementation in the Facilities Plan as the most cost-effective option.

Disadvantages

The disadvantages, or adverse impacts of Truckee Canal disposal include Truckee River flow reduction, increased pollutant loads to the Truckee Canal, effects on beneficial uses of canal water, fisheries, groundwater, water supply, public health, aesthetics, institutional arrangements and air quality. These effects are discussed in turn in this section, with the major emphasis on water quality.

Surface Hydrology

The effects of Truckee Canal disposal on surface hydrology in comparison to the base case of Truckee River disposal are primarily as follows:

- Reduces mean annual flow from Vista to Derby Dam by 8 percent; no change in Pyramid Lake inflows.
- Reduces low Q_{10} flow by up to 28 percent at Vista and Derby Dam and by up to 16 percent at Pyramid Lake inlet.
- Increases spills from Lahontan Reservoir by about 20 percent.

The reduced flow below the JWPCP outfall will have some adverse effects on water temperature, fish habitat, and recreation, although insufficient data exist to quantify these effects. With reduced flow, velocity and depth will be reduced, and heat gain from solar insolation can increase.

In turn, algal growth can increase, DO levels may be depressed, stressing fish populations in the river. The river may be less desirable for recreation under such conditions. These effects will extend below Derby Dam to the inlet of Pyramid Lake during low flow periods.

By increasing the assured amount of diversions from the Truckee River and by delivering this amount (the effluent) on a constant year-round basis, the Truckee Canal disposal option will result in increased spills from Lahontan Reservoir. This spillage is conveyed to downstream reservoirs and to the Stillwater Wildlife Refuge. The spillage will support uses in these areas, but it is lost to the Truckee River basin and is largely unavailable to the Newlands Project, except as it may be stored or directly used below Lahontan Dam.

The alternative has little effect on the occurrence and relative severity of M&I water supply deficits in the Truckee Meadows. The risk of agricultural water supply deficits would be decreased due to the assured supply of water discharged to the Truckee Canal.

The implementation of Truckee Canal disposal would require changes in the diversion schedules at Derby Dam. Revision to the diversion criteria to recognize the recommended alternative of effluent discharge directly to Truckee Canal is a relatively simple mathematical exercise, but is difficult institutionally. The total allowable diversion to the Newlands Project is currently disputed, with TCID following criteria for 406,000 acre-feet per year and the WPRS promulgating criteria for 288,000 acre-feet per year. If the criteria are modified, it may complicate this dispute, or even influence its outcome. At a minimum, an agreement between the Cities of Reno and Sparks and TCID would be required. At worst, the implementation of this alternative could become bogged down in an institutional and legal morass.

The hydrologic modeling in this EIS assumes that the JWPCP effluent would comprise a portion of TCID's allotment, replacing a like amount of surface water. It might also be possible for TCID to obtain the JWPCP effluent in a direct contract with the Cities of Reno and Sparks as a supplement to Newlands Project water. If TCID is eventually restricted to 288,000 acre-feet per year from the Truckee and Carson Rivers basins, this latter approach might be very desirable for TCID, assuming quality objections can be resolved.

Water Quality

This alternative will have adverse effects on water quality in the lower Truckee River, Truckee Canal, Lahontan Reservoir, the lower Carson River, and on beneficial uses of this water as described in this section.

The effects are summarized as follows:

- Elimination of toxicity from Truckee River and Truckee Canal due to chlorine.
- Elimination of toxicity due to ammonia, nitrite and nitrate in the Truckee River between the outfall and Derby Dam.
- Slight reduction in Truckee River flow between the outfall and Derby Dam during low flow periods causing increased concentration of background pollutants due to loss of some diluting flow.
- Continue ammonia and nitrite toxicity in the Truckee Canal.
- Pollutants, including high levels of nitrogen, will continue to be discharged to the Truckee River due to spills and seepage from the Truckee Canal.
- Algal growth potential and most pollutants, except nitrogen, in Truckee River below Derby Dam would be reduced in volume below ESP levels, even considering spills and seepage back to the Truckee River.
- Inflow to Pyramid Lake would be unchanged.
- Reduces any JWPCP threat to cui-ui and Lahontan cutthroat trout from nutrients, heavy metals and refractive organics.
- Pollutant loads in the Truckee Canal will be higher than historic levels, threatening beneficial uses of the canal.
- High nitrogen loads, along with other pollutants, will be conveyed to Lahontan Reservoir.
- During most months, Truckee River diversions will dilute effluent in the Truckee Canal, but during some winter months the canal flow will be 100 percent effluent.
- The community of Hazen will have severe public health threats from the use of untreated Truckee Canal flows, which can be 100 percent JWPCP effluent for its potable water supply.
- Algal growth in the Truckee Canal will probably change little, even though growth potential will increase.

- Algal growth in feeder canals, local irrigation ponds and other facilities will increase due to high nutrient levels.

- A significant risk of impairment to Lahontan Reservoir beneficial uses may exist due to pollutants, particularly high nitrogen loads.

- Ammonia and nitrite could reach Lahontan Reservoir, possibly causing toxic conditions and fish kills.

- Pollutants released to the lower Carson River may adversely affect wells that provide Fallon's water supply.

This dilution of effluent with Truckee River water diverted into the canal can vary from 0 (100 percent effluent) to about 14:1 dilution. During many winters the effluent would comprise 100 percent of the flow for several months. During the spring runoff season high diversions into the canal would provide maximum dilution. Average monthly dilution rates computed from hydrologic model output range from 0.1:1 up to 5.0:1 under 288 criteria, and 1.4:1 up to 4.5:1 under the 406 criteria, depending on the month.

Due to the spills and seepage from the Truckee Canal to the lower Truckee River below Derby Dam, water quality conditions in the river are expected to be similar to somewhat better than those under Truckee River disposal, but not as good as with land disposal at Dodge Flat.

The increase in TDS and chloride in the Truckee Canal will affect irrigated crops and agricultural soils. Additional irrigation may be required to flush salts through the root zone, thereby decreasing irrigation efficiency and increasing water requirements.

At the head of the Truckee Canal, most nitrogen would be in the form of ammonia, because little nitrification would take place in the enclosed pipe from the JWPCP plant to the head of the canal. The EPA recommended criterion (1976) of 0.02 mg/l for aquatic life would be frequently violated.

Lahontan Reservoir. The average annual total nitrogen load to Lahontan Reservoir will increase from the existing 1,947 pounds per day through an ESP load of 2,183 pounds per day to a range of 3,890-5,037 pounds per day at 40 mgd, depending on whether the 288 or 406 criteria are assumed. Under these two scenario conditions the estimated background load without a JWPCP discharge would be 158-664 pounds per day. Alternative L-1 does not include nitrification or denitrification treatment processes, accounting for the large increase in total nitrogen load over other alternatives.

Phosphorus removal is a feature of the 40 mgd Master Project, however, and total phosphorus loading is projected to be from 76-109 pounds per day. The comparable 1978 load would be 468 pounds per day, and the 30 mgd ESP load would range from 19-60 pounds per day to the reservoir, depending on whether 288 or 406 criteria are assumed.

After considering the absence of any field testing, it was concluded that the EIS analysis should assume that the total canal flow would mix into the reservoir before release from the reservoir.

Discharge to the Truckee Canal (Alternative L-1) is expected to significantly adversely affect the aquatic ecology and the beneficial uses of Lahontan Reservoir. The state of eutrophication of the reservoir reveals a present condition of excessive nutrients with nitrogen being a limiting nutrient.

In addition to effects on algae, the large increase in nitrogen loading may have other possible effects that depend on the form of the nitrogen, i.e., nitrite or ammonia. If large amounts of ammonia enter the reservoir there is the opportunity for fish kills to occur. The treatment plant would discharge an average ammonia concentration of 16.0 mg/l.

Acutely toxic conditions and fish kills can occur if the concentration of unionized ammonia exceeds about 0.2 mg/l NH_3-N.

Under some circumstances algae, especially blue-green algae, impart an unpleasant flavor to fish. Excessive eutrophication and chronic soluble inorganic nitrogen limitations appear to increase the changes for blooms of nitrogen-fixing blue-green algae. Among the problems engendered by this condition is the impacting of unpleasant flavors and odors to the water and fish. The soiling of equipment and bathing gear can become significant enough to inhibit recreational uses. Furthermore, if the reservoir were to be used as a drinking water supply, expensive water treatment processes to remove taste and odor may be required.

The Truckee Canal option has the potential of impacting water quality conditions below Lahontan Reservoir. During the irrigation season when canal water can by-pass Lahontan Reservoir, or if it comprises a major portion of the reservoir release, the lower Carson River will receive most of the JWPCP load. This will increase total pollutant loading to the river and agricultural lands.

Fish and Wildlife

Fish. The Truckee Canal disposal alternative (L-1) can significantly and adversely alter the canal for fish habitation while improving the quality of fish habitat in the Truckee River from Steamboat Creek to Derby Dam.

The effluent is expected to be acutely toxic from ammonia and nitrite. Any failure in chlorination and dechlorination control would also inject chlorine toxicity into the canal.

Endangered Cui-ui. The endangered cui-ui may be adversely impacted by two features of the Truckee Canal disposal alternative (L-1). During treatment plant failures, insufficiently treated toxic and oxygen-consuming wastewater could be released from the canal into the lower Truckee River. The magnitude of the effects of such an event would be contingent on the size and duration of the failure, dilution flows in the river, and season. A maximum effect could be expected during low flow conditions in the spring and early summer spawning and larval fish dispersion activities.

During some months and flow schedules this alternative (L-1) has the potential to significantly alter instream flow below Derby Dam, for example, using the 406 criteria scenario, instream flows during March may be reduced during peak flow years and increased during subnormal water years. In the case of the the 288 scenario both high and low flow conditions are reduced while median flows are increased in March. However, in the data presented the canal disposal option seems to slightly improve low flow conditions. It is assumed that future conditions may lie somewhere between the 406 and 288 scenario cases and that any alteration in flow attributable to the JWPCP can be remedied through river operations not inconsistent with present practices.

Threatened Lahontan Cutthroat Trout. Water quality in the native Truckee River habitat of this species will be improved and, insofar as conditions relatable to the JWPCP are concerned, will not limit the productivity of trout.

Wildlife. This alternative contains no identified, significantly adverse impacts on wildlife.

Groundwater

The Truckee Canal discharge alternative (L-1) will adversely affect groundwater along the Truckee Canal and in areas where wastewater will be used for irrigation. At present a mixture of plant effluent and Truckee River water, nearly always diluted 1:1 or more, is diverted into

the Truckee Canal for irrigation use and storage in Lahontan Reservoir. With the Truckee Canal disposal option, effluent will comprise 100 percent of the flow in the canal for some months of many years.

Public Health

The discharge of secondary treated, filtered, and disinfected wastewater to the Truckee Canal poses a significant public health risk to the Town of Hazen which withdraws water directly from the canal for domestic use. Diversion and distribution to about 20 customers is accomplished by a private water company. The water is untreated. The water right for a reported 200,000 gallons per day is expected to support future residential and commercial development in Hazen. Drinking water quality standards for coliform bacteria, nitrate nitrogen and ammonia nitrogen will probably be exceeded. Other potential effects are not defined. During times when river water is not being diverted into the canal, flow in the canal would be totally comprised of treated sewage. Although the effluent would be disinfected, the risk for contamination and disease infection would be substantial.

Cultural Resources

Based on the preliminary pipeline route, construction, maintenance and increased human activity could disturb three prehistoric sites (26Wa2, 26St27, and 26St5), of which two have National Register potential. One petroglyph site located on cliffs along the Truckee River (26Wa1601), with National Register potential, also appears to be located very close to the proposed pipeline. In addition, two other prehistoric sites (26Wa2679 and 26Wa2131), one of which has National Register potential, are located in the vicinity of the proposed pipeline and could be affected by increased human activity in the area.

Institutional Concerns

Disposal to the Truckee Canal raises many institutional questions from water ownership to canal maintenance. Agreement between the cities and TCID would be the minimum institutional arrangement necessary for implementation of Alternative L-1. However, the WPRS is likely to become involved, since the discharge amounts to a guaranteed annual diversion to the Newlands Project regardless of hydrologic conditions, and WPRS promulgates these diversion criteria. Resolution of this issue is likely to become a complication of current litigation between WPRS and TCID.

The question of who owns the effluent is one aspect of this issue. If the cities own the water it may be determined that the 42,000 AFY of effluent can be in addition to TCID's rights to Truckee River water. This complicates the impact analysis, which assumes the effluent to be part of TCID's allotment.

The continuous discharge to the Truckee Canal presents potential problems for TCID. Does TCID own the effluent once it is in the canal, and if they do, are they responsible for any pollutants it contains? Questions of crop failure, crop damage, degradation of Lahontan Reservoir and public health are raised by this issue. TCID will also have a more difficult time maintaining the canal since it will always have some flow. If a storage reservoir is provided at the JWPCP, it may be possible to work on alternate days, although the canal would not be completely dry.

Energy

The Facilities Plan (Kennedy/Jenks Engineers, 1980) contains insufficient data to quantify energy use of the Truckee Canal alternative. This alternative involves a treatment process that is less energy-intensive than AWT with Truckee River disposal, and involves gravity discharge. It should have the least energy consumption of the three alternatives.

Mitigation of Truckee Canal Disposal Impacts

- Reduction of mean annual flows between Steamboat Creek and Derby Dam by about 8 percent.

This impact can be mitigated by leaving the effluent in the Truckee River. It can also be mitigated by reducing consumptive losses in the basin (see Mitigation of Dodge Flat Impacts section), reducing water exports, or importing water to the basin. All mitigations except removal of effluent from the river would increase the flow to Pyramid Lake above present conditions.

- Reduction in low Q_{10} flows of up to 28 percent.

Each of the foregoing mitigations could eliminate this reduction. Also, it can be mitigated by revising river management criteria to enable upstream storage of more water to augment flows in low flow periods. Many institutional questions would need to be resolved in order to implement this mitigation measure.

- Increased concentration of background pollutants in Truckee River between Steamboat Creek and Derby Dam due to flow reduction.

This impact could be mitigated by providing flow augmentation during low flow periods to protect water quality.

- Increased pollutant loads and increased algal growth in feeder canals and storage reservoirs fed by the Truckee Canal.

Advanced waste treatment, including nitrogen and phosphorus removal, prior to discharge, would mitigate this potential problem.

A structural mitigation to protect the reservoir could be implemented to divert all nonirrigation season flows from the canal to the lower Carson River. Although by-passing the reservoir would benefit the reservoir it would constitute a significant adverse impact on the lower Carson River. This mitigation may also impair existing water rights and contracts. Data have not been developed to analyze the consequences of this option.

- Toxicity to fish in the Truckee Canal and Lahontan Reservoir, and nutrient build-up in Lahontan Reservoir.

Advanced waste treatment, including nitrogen and phosphorus removal, filtration, chlorination and dechlorination prior to discharge would adequately mitigate this problem. Dechlorination may need to occur at the discharge point to reduce odors and prevent chlorine toxicity.

- Pollution of lower Truckee River and threat to cui-ui due to spills and seepage from Truckee Canal.

This impact can be eliminated by constructing a re-regulation structure in the Truckee Canal prior to introduction of the effluent. In this way the flow in the canal can be reduced to the quantity needed for the Newlands Project at the head of the canal. Seepage could then be eliminated by lining the canal. However, lining the canal prohibits groundwater recharged from this source, diminishing well yields and affecting beneficial uses associated with canal seepage established since construction of the Truckee Canal.

Alternatively, the effluent would be piped an additional distance (up to 10 miles) before introduction to the canal, avoiding spills and canal seepage, and eliminating the need to line the canal.

Advanced waste treatment would also reduce the severity of this impact.

- Substantial increase in public health risk to Hazen.

This serious risk could be mitigated by changing Hazen to a source of water totally free of effluent. Alternatively, Hazen could develop local groundwater sources and treat to remove any objectionable constituents (such as nitrate from canal seepage) and to disinfect the water. This impact can also be mitigated by discharging the effluent to the canal downstream of Hazen or by removing it from the canal entirely.

- Increase in public health risk to groundwater supplies in Fallon, Fernley and Wadsworth areas.

This impact can be mitigated by treatment of the water supply, advanced waste treatment of the effluent prior to discharge, providing an alternative water supply, or removing the effluent from the canals which recharge the respective groundwater areas. Monitoring of well water quality should be required.

Impacts of Effluent Disposal to the Truckee River
(Alternatives T-5, 6a, 9, 12, 14a, 15)

The facilities needed to implement the Truckee River disposal option include an expansion of the 30 mgd ESP, which includes secondary treatment, phosphorus removal, and dechlorination, to an average peak month flow capacity of 40 mgd. A nitrogen removal treatment process and effluent filtration would be added as part of the 40 mgd Master Project. The Steamboat Creek outfall location would be moved to two new locations in the Truckee River downstream of the JWPCP. Sludge would be piped to Spanish Springs Valley and disposed of by spreading on the land. The impacts of this alternative are summarized in Table 3.

The particular advantages associated with the Truckee River disposal options are:

- Continued discharge of the JWPCP effluent to the river does not directly alter river flow or impair the security of downstream water rights.

- Except for the land required to construct the emergency storage lagoon and the land needed to expand the facilities, this alternative does not use additional private or public lands for wastewater treatment and disposal.

- A monetary benefit is gained by using the wastewater assimilative capacity of the Truckee River system to treat waste products. Boundary definitions for the waste assimilative capacity are the state water quality standards.

- Except for the NPDES permit issued hy the NDEP to ensure that the JWPCP meets the state's water quality standards, there is a minimum of contractional, regulatory or policy involvement by other entities.

The river disposal option will achieve incremental benefits that remedy or lessen several environmental problems associated with present circumstances.

- The Truckee River downstream of Steamboat Creek will generally achieve water quality standards designed to protect and maintain beneficial uses including the threatened and endangered fish.
- Periphyton and associated biological communities will be reduced in size.
- Concentrations of DO in sediments will increase and DO minimums will be lessened in magnitude.
- Acute toxicity in the vicinity of the outfall will likely be completely abated.
- Acute and chronic toxicity associated with unionized ammonia, nitrite, and nitrate will be abated.
- Risks of contamination and infection of humans will be reduced by improved disinfection and effluent filtration.
- The two-location point of discharge is designed to mitigate outfall effects.

Surface Water Hydrology

The continuation of direct discharge of the Truckee River would have no effect on surface water hydrology, except as may occur due to the growth supported by expansion of the 30 mgd ESP JWPCP to the 40 mgd Master Project.

Water Quality

The adverse effects of AWT disposal to the Truckee River on water quality are identified as follows:

- TDS levels and total salt loading will increase in the Truckee River and Truckee Canal due to AWT.
- Except for nitrogen, nutrients will still remain in the Truckee River at slightly higher than ESP levels.
- Total phosphorus and total nitrogen standards for the Truckee River may be exceeded at times due to JWPCP discharge.
- Algal growth potential in the Truckee River and Truckee Canal will be much less than present conditions, but will be slightly increased over ESP conditions.

- A maximum temperature rise of 2.3°C is predicted at the outfall due to JWPCP discharge, if effluent is discharged at maximum recommended temperature.

- Oxygen demanding substances will continue to be discharged but with a lower total oxygen demand, benefitting DO levels.

- Increased salt loads may lead to decreased irrigation efficiencies and slightly greater agricultural water demands.

- Soil salinity problems in Carson Division of the Newlands Project could be aggravated by increased TDS levels.

- Algal growth potential in the Truckee River between Derby Dam and Pyramid Lake should be reduced below present levels, but increased slightly above ESP levels.

- Pollutants from the JWPCP will continue to enter Pyramid Lake.

- Additional nitrogen from the JWPCP may stimulate algal blooms in Pyramid Lake, degrading beneficial uses.

- Additional nitrogen from the JWPCP may stimulate algal blooms in Lahontan Reservoir, degrading beneficial uses.

Truckee River. The reach of the Truckee River above the confluence of Steamboat Creek is not directly influenced by the JWPCP Master Project, although the Truckee River above and below the JWPCP is influenced by wasteloading in California. Secondary impacts due to urbanization will also affect quality in this upstream reach. If nutrient loading to the river above Stateline increases in response to urban growth and the relaxation of effluent in river standards, Reno's and Sparks' ability to meet water quality standards at Lockwood may be impaired.

As growth occurs, urban runoff will increase without restrictive nonpoint source control programs and will adversely affect water quality. The majority of urban runoff enters the Truckee River from Steamboat Creek and north Truckee drain. The degradation of water quality by urban runoff will be offset to some extent by future reductions in agricultural return flows that occur as urban land uses replace irrigated agriculture. Urban storm runoff, agricultural runoff, and other nonpoint source pollutants are being addressed through local Section 208 planning. The local planning entity (WCOG) is confident that efforts to control nonpoint source pollutants will be successful in reducing background pollutant loads in the Truckee River.

It is assumed that acutely toxic conditions should not occur with the 40 mgd Master Project based on the design control in the NPDES permit. These conditions typify JWPCP wasteloading for the three disposal alternatives.

Pyramid Lake. Over time, nutrient materials added by the JWPCP move down the river and a portion ends up in Pyramid Lake.

It is assumed that total nitrogen and total phosphorus movement from the JWPCP to Pyramid Lake are practical indicators of the proportional effects of the Master Project

There is nothing in the available data to indicate that fish and wildlife in the lake will be significantly directly affected by Master Project river discharge. Long-term reductions in nutrient loading may have some secondary benefits for trout, such as diminished risk for low levels of dissolved oxygen in the hypolimnion and less intense algal blooms, but magnitudes of change are unpredictable at present. On the other hand, treated municipal wastewater always poses some level of risk to downstream biological resources. The total list of potential pollutants, toxics, carcinogens and mutagens in a waste stream is never fully known. The sensitivities of most species to such substances is barely recognized. The insidious nature of toxic and carcinogenic effects through long-term bioaccumulation of exotic chemicals are not well described. Consequently, if for no other reason than lack of knowledge, it is assumed that wastewater discharge to the river and then to Pyramid Lake poses a low risk of undefined dimension to flora and fauna in the lake.

Truckee Canal. Part of the Truckee River flow is diverted into the Truckee Canal at Derby Dam. Water quality conditions in the canal will reflect those in the Truckee River above the diversion point. It was assumed that pollutant loads would be divided proportional to the flow split at Derby Dam, since details on nutrient uptake and releases in the upstream Truckee River are lacking.

Phosphorus loads will be increased by 33 percent over ESP loading, but decreased over existing conditions. Nitrogen loads will be reduced, lessening the algal growth potential in the Truckee Canal in addition to reducing the amount of oxygen demanding material.

The TDS and chloride loads are projected to increase over current and ESP conditions. This will primarily impact the use of Truckee Canal water in the Carson division of the Newlands Project.

Lahontan Reservoir. Water that is not spilled, diverted, or lost to the Truckee Canal by seepage, flows into Lahontan

Reservoir. Neither the amount of nor the scheduling of water flowing into Lahontan Reservoir would be affected by river disposal.

The reservoir during this 20-year period is expected to remain nitrogen-limited. It is difficult to speculate about the precise nature of any ecological change in the reservoir without the use of mathematical models and adequate nutrient budget data to interpret the relative significance of annual changes in nutrient loadings. Judgmentally, it is expected that algal bloom conditions in the lower end of the reservoir will either stabilize or decrease with the expected reduction in nutrient loading. Consequently, there should be improvement in habitat conditions for all aquatic fauna, and sportfishing and recreational uses should be improved. Filtration of the effluent at the JWPCP should reduce pathogenic risks to public health, but risks from toxicants, carcinogens, mutagens, and taste and odor agents are not expected to appreciably change. The effects of using Lahontan Reservoir water on agricultural soils and crops are not expected to measurably change from present circumstances.

Fish and Wildlife

The ESP will partially abate a major adverse impact on aquatic organisms by reducing residual chlorine in the effluent to 0.01 mg/l or less.

The Master Project will provide wastewater treatment to remove the remaining acute and chronic toxicities caused by nitrite, and nitrate and ammonia. Relocation of the point of discharge to two locations will provide improved effluent dispersion and dilution over the Steamboat Creek discharge (PEL, 1979). The two outfall locations should decrease the risk that fish will encounter the effluent plume; that effluent will cause blockage of the cross-sectional area of the river; and that large benthic areas will be severely impacted by the discharge. Filtration of the effluent to remove suspended materials will reduce effluent turbidity and further improve benthic habitat immediately downstream of the point of discharge by limiting the amount of putrescible organic matter that can settle into the bottom substrate. These are major benefits to the aquatic habitat and fish.

Implementation of the Master Project with river disposal is expected to remove conditions now caused by the JWPCP that limit occupancy of the river by trout and other fishes. Habitat conditions that fully support trout spawning and reproduction in the reach between Steamboat Creek and Nixon may not occur in many years because of the putrescible, organic content in bottom sediment and high water temperature.

Endangered Fish - Cui-ui. Available data do not indicate that the cui-ui will be directly and significantly affected by normal operations of the Master Project using river disposal. The data do not show that enrichment of the Truckee River or other waste substances from the JWPCP are now limiting factors for the cui-ui. The Master Project is projected to improve existing water quality conditions and reduce total nutrient inflow to Pyramid Lake. These improvements should augment other actions being taken by the USFWS to recover the species (USFWS, 1978) over a long period of time that is undefined. Nutrients, salts, and other wastewater constituents entering Pyramid Lake may alter this cui-ui habitat, but the degree of change is not projected. The JWPCP will continue to add to the nutrient and salt load of Pyramid Lake.

Threatened Fish - Lahontan Cutthroat Trout. Adult and juvenile trout, including cutthroat trout, are expected to survive and grow in the river when river temperatures are less than 21-23°C except perhaps at the immediate point of discharge. Discharge to the river may continue to impair trout habitat between the JWPCP outfall and Derby Dam by causing spawning habitat to be less than optimum quality. Aufwuchs growths on rocks and gravel and the penetration of decomposing organic matter into spawning gravel establishes a significant risk that DO concentrations in gravels will be insufficient for normal egg and sac fry growth and survival. Confirmation or denial of this type of impact must be derived from monitoring studies following implementation of the ESP. Implementation of the Master Project is not expected to significantly alter seasonal cutthroat trout habitat below Derby Dam or in the Truckee Canal.

Wildlife. There is no indication that wildlife will be directly affected by the Master Project Truckee River disposal options.

Groundwater

The discharge of effluent to the Truckee River is not expected to have any direct effect on Truckee Meadows groundwater. The AWT river disposal alternatives (Alternatives T-5, T-6a, T-9, and T-15) will place the diluted effluent in contact with the groundwater adjacent to the Truckee River in an area that is generally believed to contribute groundwater flow to the river. The diluted effluent is not expected to percolate into the groundwater, since this would be contrary to the prevailing gradient.

Water Supply

River disposal of AWT effluent will perpetuate the current pattern of domestic use of highly diluted wastewater in Hazen, and in Fernley, Wadsworth, Fallon, and other areas relying

on Truckee River and Truckee Canal water. Risks to public health from use of this water are expected to decrease from the present level with the ESP, and then increase slightly as Master Project flows increased from 30 mgd to 40 mgd.

Potential Risks to Public Health

Some risk from public exposure to sewage exists at every wastewater treatment and disposal operation. Treatment and disinfection are designed to reduce the level of risk, but in general risk is proportional to the degree of human contact with the wastewater and the adequacy and reliability of the treatment process.

There is a level of health risk to water-contact recreationists and domestic water supply users that is not quantified. During normal Master Project operations and average river flows the risk is reduced to commonly accepted levels, which are based on general observations that there is no evidence of infection in such cases.

Cultural Resources

Assuming that the discharge pipeline (if required) would follow the river for no more than 2 miles (or about to Lockwood), and it would follow the preliminary route designed for the pipelines under Alternatives L-1, L-6, and L-7, one prehistoric site identified to date (26Wa2) which has National Register potential, could be disturbed by construction and/or maintenance of the pipeline.

Institutional Considerations

Implementation of the Master Project river disposal option is not expected to infringe on water rights, water litigations, or river water operations agreements. However, there is great uncertainty about projecting the institutional consequences of any project even secondarily affecting water flow in the Truckee River system.

Energy

The Facilities Plan (Kennedy/Jenks Engineers, 1980) contains insufficient data to quantify energy use of the Truckee River discharge alternative. This alternative involves a treatment process that is more energy intensive than the Truckee Canal or Dodge Flat alternatives. Disposal would be by gravity, which would use no energy.

Mitigation of Truckee River Disposal Impacts

- Ammonia, nitrite and nitrate toxicity may remain in the Truckee River below the outfall in October and November in low flow years.

This impact could be mitigated by revising flow criteria to allow flow management for water quality protection at low flows.

Additional treatment for further nitrogen removal and control of toxicity would also be possible, although it would add to the cost. Postconstruction monitoring of the Truckee River below the discharge should be required to better define the magnitude of the problem and document the effectiveness of mitigation measures.

- TDS and salt loading to the Truckee River and Pyramid Lake will increase.

- Increased TDS may require greater irrigation application to flush salts from the root zone.

These two impacts could be mitigated by removing the discharge from the river; using a different treatment process that would not add salts to the effluent; removing part of the salts from the effluent prior to discharge, usually a costly and energy-intensive process; or by mitigating TDS contributions from another source on the Truckee River as a trade-off.

- Nitrogen and phosphorus standards will continue to be exceeded in low flow periods due to JWPCP discharge.

This impact can be mitigated by augmenting low flows through changes in river management, a difficult and complex action. It can also be mitigated by further treatment, which would increase project costs, or through removal of the discharge from the river.

- The Truckee River temperature could be raised by up to 2.3°C (4.1°F) by the outfall.

This impact is a component of a complex temperature problem, and the mitigation method will have to be determined in relation to the total problem rather than just for the JWPCP. Monitoring of actual temperature changes should be required.

- JWPCP pollutants will continue to enter and accumulate in Pyramid Lake, posing a long-term threat to the endangered cui-ui.

This impact can be mitigated by further treatment, including reduction in TDS, and by removal of the discharge from the Truckee River. Long-term monitoring of nutrients should be continued to quantify changes due to the plant discharge and to determine if further mitigation is necessary.

- Public health risk to Hazen water supply users, and to other communities dependent on groundwater.

The public health threat to Hazen could be reduced by treating the water supply. The threat could be eliminated entirely by developing a new water source entirely free of effluent. For the other affected communities that rely on well water, treatment of the well water would help mitigate the threat. This impact could also be eliminated by removing the discharge from the Truckee River.

Impacts of Land Disposal at Dodge Flat (Alternatives L-6 and L-7)

The facilities needed to achieve disposal at Dodge Flat include modification of the ESP, phosphorus removal facilities, and the addition of new facilities to bring the plant capacity to 40 mgd of secondary treatment. Chlorinated effluent would be converged by gravity through 133,000 feet of pipeline located adjacent to the Truckee River to a reservoir on Dodge Flat. Sludge would be piped to Spanish Springs Valley and disposed of by spreading on the land. In the case of Alternative L-6, stored effluent would be pumped during the growing season to center pivot irrigation sprinklers to irrigate 4,200 acres of forage crop. During the winter the effluent would be spread on land in Olinghouse Canyon to evaporate and percolate into the subsurface aquifer. In Alternative L-7 effluent would be turned into the Fernley drain during the nonirrigation season.

The reuse of wastewater to grow agricultural crops typically offers potential cost and renewable natural resource benefits, especially in arid regions such as Nevada. Potential cost benefits are usually associated with the need for less complex and thus lower cost treatment plants. Renewable resource benefits in arid areas generally are linked to water conservation in that irrigation water supply is either augmented or released for another type of beneficial use. Moreover, soil filtration is viewed as an optimum form of wastewater treatment in situations where groundwater will not be degraded. The general benefit may apply over the 20-year planning period to the Dodge Flat Alternatives (L-6 and L-7). Several benefits have been identified that apply in particular to land disposal at Dodge Flat.

- Removes the Reno-Sparks JWPCP wastewater discharge from the Truckee River.

- Improves water quality and fish habitat quality downstream of Steamboat Creek to a condition where water quality would not be a significant impediment to a productive fishery.

- Improves the opportunity for recovery of the cui-ui and Lahontan cutthroat trout insofar as water quality problems caused by the JWPCP are corrected.

- Develops a technologically up-to-date agricultural operation that would provide new employment and revenue to the Paiute Indian Tribe.

- Improves opportunities to develop the Truckee River and Truckee Canal for multiple recreational uses to serve the future urban population.

- Significantly reduces the input of potential pollutants to Pyramid Lake, resulting in a reduction in the rate of eutrophication of the lake.

- Significantly reduces the input of nutrients and other potential pollutants into Lahontan Reservoir, which is expected to reduce algal blooms and mitigate a decreased DO problem.

- Requires standard secondary wastewater treatment of proven reliability and efficiency.

- Lower operations and maintenance requirements.

The disadvantages, or adverse impacts of Dodge Flat land disposal, encompass Truckee River flow reduction, potential water quality changes, reduction of water available to beneficial uses, institutional ramifications, and air quality impacts. These effects are discussed in this section, with the emphasis on flow reduction effects and water quality changes.

Surface Hydrology

The effects of Dodge Flat disposal on surface hydrology are primarily as follows, as compared to a base case of Truckee River disposal:

- Reduces mean annual flow from Vista to Derby Dam by 8 percent, and reduces inflow to Pyramid Lake by 9 percent.

- Reduces low Q_{10} flows by up to 65 percent at Vista and Derby Dam and up to 73 percent at Pyramid Lake inlet.

- Decreases spills from Lahontan Reservoir by 2-4 percent.

- Increases the risk of M&I deficits slightly, and substantially increases the risk of Newlands Project deficits.

Water Quality

The effects of land disposal at Dodge Flat on water quality are described as follows, assuming no return flow from Dodge Flat.

- Elimination of toxicity from Truckee River due to chlorine, ammonia, nitrite and nitrate.

- Reduction of river flow causing increased pollutant concentrations between JWPCP outfall and the inlet to Pyramid Lake. Most critical in low Q_{10} flows, when up to 65 or 73 percent of diluting flow could be absent.

- Enables better identification and mitigation of remaining pollutant sources.

- Algal growth potential in the Truckee River and Truckee Canal will be greatly reduced.

- DO concentrations would be higher.

- Other water quality parameters would be improved.

- Threats to quality and beneficial uses of Pyramid Lake would be reduced.

- Lower Pyramid Lake level due to loss of 9 percent of inflow would increase TDS.

- Improvement of Lahontan Reservoir quality, with increased opportunity to optimize beneficial uses.

Pyramid Lake. The removal of the JWPCP effluent from the Truckee River would greatly reduce any potential for Reno-Sparks municipal sewage to impair the quality and beneficial uses of Pyramid Lake. There would remain the risk associated with a rupture of the outfall pipeline from the JWPCP to Dodge Flat.

There is also the risk that return flows from Dodge Flat (likely within 10 years under Alternative L-6) would offset many of the expected benefits of land disposal.

The current total nitrogen load to Pyramid Lake is about 3,781 pounds per day. The total nitrogen load discharged to the lake with full operation of the 30 mgd ESP would be

about 5,593 pounds per day which would be reduced to a background load of 2,055-2,739 pounds per day using land disposal and also depending on the TCID operating criteria. Substantial reductions in the total nitrogen load would occur, which should in the long run reduce any trend toward undesirable levels of eutrophication.

Over the long term, the reduction in annual inflow would exacerbate the problem of stablizing and reversing the trend of lowering the lake level, which began in 1906. The magnitude of a 9 percent inflow reduction on a stabilized lake elevation has not been computed.

Lahontan Reservoir. Land disposal (Alternatives L-6 and L-7) provides the largest benefits for Lahontan Reservoir because waste loads originating from the JWPCP do not reach the reservoir. Certainly, enhanced water quality improves the opportunity to maximize the value of its beneficial uses.

Fish and Wildlife

Fish. Implementation of the Dodge Flat land disposal option would remove the JWPCP effluent from the Truckee River and greatly improve habitat conditions for fish and other aquatic organisms. Thereafter, any impacts of the Master Project on river water quality would be of a secondary or accidental nature.

The land disposal option does have direct and significant effects on instream flow, which can impair fish habitat. In comparison to alternatives that discharge to the Truckee River the land disposal option generally reduces the instream flow downstream of Steamboat Creek. The relative effect of this reduction on average monthly flows at Vista is about 15-20 percent with the 406 criteria, which may be less significant to fish production between Vista and Derby Dam than the benefits to the fishery of improved water quality.

Endangered Fish - Cui-ui. Reductions in flows in the river downstream of Derby Dam and especially at the mouth of the river are potentially harmful to the cui-ui and adversely affect USFWS plans for the recovery of this endangered species. Based on the age groups of cui-ui in Pyramid Lake, it is evident that reproduction success is greatest when flow from the river to the lake during the spawning and dispersion period is largest. Reductions in flows between March and May could reduce spawning activity and the survival and transport of larval fish back to the lake.

The annual decrease of about 9 percent of inflow to Pyramid Lake could exacerbate the problem of cui-ui passing from the lake to the river by retaining the lake at a lower elevation.

Reductions in Truckee River flow also have the potential to reduce the amount of rearing habitat in the lower river and to affect ambient water temperature and water quality. Field studies would be required to test the significance of the effects of potential changes in instream flow on the habitat of particular cui-ui life stages and activities.

Threatened Lahontan Cutthroat Trout. Although Lahontan cutthroat trout do not now complete a natural life cycle involving Pyramid Lake and the Truckee River, it is a goal of the USFWS (1979) to restore the fish to its natual habitat. One of several habitat features that must be improved to achieve this goal is to increase the instream flow in the lower Truckee River and to abate water quality problems that would impair opportunities for this trout to complete its life cycle. Implementation of the land disposal option would abate those limiting water quality problems caused by the discharge to the river of treated wastewater from the JWPCP. Toxicity from sewerage sources should no longer be present in the river. Spawning habitat between Vista and Derby Dam should improve through the abatement of excessive nutrient enrichment, and during years when water temperatures are sufficiently low during the spawning and rearing season, trout reproduction may successfully occur.

Flow reductions associated with the land disposal option may offset some of the benefit of improved water quality. Flow reductions in both the Vista to Derby Dam and lower reaches of the river offer the potential to impair trout migration and diminish spawning habitat. Quantification of any effects caused by the scenario level flow reductions would have to be determined by field analysis.

The abatement of water quality problems in the river caused by the JWPCP, and the maintenance of present levels of river flow will, without other habitat improvements, not cause the Pyramid Lake population of Lahontan cutthroat trout to use the improved river habitat. Recovery of the species to a natural, reproductive state would require numerous additional habitat improvements (USFWS, 1979).

Wildlife. An arid sagebrush plain would be converted to 4,200 acres of irrigated land, roads, a 1,000 acre-foot storage reservoir and ranch support facilities. Animal species now using the natural habitat would be displaced and many would die within a short period of time. Species adaptable to irrigated agriculture may increase in numbers. The creation of new habitat types should attract species to the area that are not now there. Locally the impact on wildlife would be significant, but on a regional basis the impact would be minimal. No endangered wildlife are reported to be using the impacted area.

Groundwater

Irrigation of lands at Dodge Flat with effluent will affect groundwater quality and beneficial uses of groundwater in that area. In order to prevent salt build-up, sufficient irrigation water will have to be applied to periodically flush salts through the root zone. An increase in TDS, nitrates and other conservative substances will likely occur.

Rapid infiltration of 22,000 AFY in Olinghouse Canyon on the western boundary of Dodge Flat (Alternative L-6) will substantially and adversely affect the groundwater basin in the Dodge Flat area.

Discharge of 22,000 AFY to the Fernley drain (Alternative L-7) will affect groundwater quality in the vicinity of the drain and in the Fernley Game Management Area. It is possible that infiltration could adversely affect beneficial use of the shallow aquifers in this area.

Risk to Public Health

The probable increase in nitrate levels in wells in the Wadsworth area as discussed in the previous sections constitutes a threat to public health, particularly through an increased risk of methemoglobinemia in infants.

Cultural Resources

One prehistoric site, which has National Register potential (26Wa2678), would be directly affected by the irrigation of Dodge Flat. Two additional sites (26Wa2681 and 26Wa2682), one of which has National Register potential, appear to be located on the edge of the irrigated area. These sites could be disturbed through increased human disturbance if not directly by irrigation activities.

No cultural resources investigations have yet been initiated for the Olinghouse Canyon rapid infiltration area or for the Fernley drain pipeline route.

Land Use

Minor land use conflicts and changes in use will occur through construction of a 26.4-mile buried conveyance pipeline, a storage reservoir at Dodge Flat and cultivation of Dodge Flat under this alternative.

Soils and Productivity. Generally, soils receiving wastewater will be impacted by increased organic matter, pH movement toward neutral, and increased nutrient levels.

Institutional Concerns

Land disposal at Dodge Flat will raise significant institutional issues regarding water availability and water rights. The Indian tribe currently has over 30,000 AFY of water rights, which would theoretically allow diversion of nearly all of the effluent in the early years of the Master Project. The Cities of Reno and Sparks, the tribe, or another group may need to acquire additional rights to enable discharge of 42,000 AFY to the land. However, the lack of return flow from this disposal and the effects of the reduced flow on Pyramid Lake and its fishery are likely to precipitate action by one or more of the many competing users of Truckee River water to reapportion the remaining available supply. Substantive institutional and legal questions will result, and court action is likely.

A related question concerns the ownership of the plant effluent. It is not clear whether the cities that treat the wastewater acquire title to it or if the title vests with the water right holders on the river. The resolution of this issue would affect the ease of transfer of the water to Dodge Flat, and might imply that the tribal water right could be exercised in addition to the 42,000 AFY disposal at Dodge Flat.

Energy

The Facilities Plan (Kennedy/Jenks Engineers, 1980) contains insufficient data to quantify energy use of the Dodge Flat disposal alternative. This alternative employs a less energy-intensive treatment process than AWT with river discharge. However, it does require large pumps for effluent distribution and irrigation at Dodge Flat.

Mitigation of Dodge Flat Land Disposal Impacts

- Reduction of mean annual flows by 8-9 percent below Steamboat Creek.

This impact can be fully mitigated by leaving the effluent in the Truckee River. It could also be partly mitigated by reduction in consumptive losses in the Truckee River basin.

This impact could also be mitigated by reduction of water exports from the basin or importing water from another basin. These actions would have other consequences that could be at least as serious as the impacts of land disposal in the Truckee River basin.

- Reduction in low Q_{10} flows by up to 73 percent.

This impact can be mitigated by the methods described for the previous impact. It can also be partly mitigated by revising river management criteria to enable upstream storage of more water to augment low flow periods.

- Substantial increases in risks to Newlands Project water shortages.

This impact can be mitigated by all of the methods described for the preceding two impacts. It could also be mitigated through the purchase of some Newlands Project lands and their withdrawal from irrigation.

- Increased concentration of background pollutants in Truckee River between Steamboat Creek and Pyramid Lake due to flow reduction.

This impact can be mitigated by providing flow augmentation during low flow periods to protect water quality. This requires a change in the river management rules, which is a difficult problem to resolve among the many affected institutions.

- Seepage of effluent applied for irrigation and percolated for disposal at Dodge Flat, polluting the lower Truckee River and Pyramid Lake.

The impact of these return flows can be reduced substantially, if not entirely, by eliminating the rapid percolation and discharging nonirrigation season plant effluent to an area where return flows to the Truckee River are not possible.

The impact from rapid infiltration could also be mitigated by storing the nonirrigation season plant effluent that would otherwise be percolated. This stored plant effluent plus current plant effluent would then be applied to irrigate nearly twice the acreage during the irrigation season.

- Reduction in flows may lower Pyramid Lake and adversely affect cui-ui habitat. Lower flows may also inhibit cui-ui passage into the lower river.

This impact can be mitigated by eliminating the flow reductions predicted to occur. This can be accomplished by the methods outlined for the first two impacts listed in this mitigations section.

- Contamination of wells at Wadsworth by irrigation percolation and rapid infiltration of effluent at Dodge Flat.

This impact can be mitigated by not irrigating or percolating effluent near Wadsworth or by providing an alternative water supply. Well water quality should be regularly monitored.

o Public health risk from aerosols at Dodge Flat.

The potential for human contact can be minimized through incorporating design features and operational controls into the project, e.g., windbreaks, buffer zones, low pressure spray nozzles, low profile sprinklers, application methods to fit the terrain, wind patterns and adjacent land use, and alarm systems to ensure treatment reliability before spraying. The irrigation area should be fenced to impede trespass and marked with prominent signs warning of the risk to public health.

o Potential loss of or damage to historic and prehistoric cultural features.

Prior to project design, a 100 percent survey will be needed to precisely determine the number and extent of cultural resources and necessary mitigations.

o Land use impacts at Dodge Flat, including loss of wildlife habitat and grazing land.

The losses of such uses could be mitigated through the use of other land areas, although such areas would also have certain land use impacts.

Impacts of JWPCP Sludge Handling and Disposal

The sludge disposal element of the JWPCP would increase the sludge disposal capacity from 20 mgd to 40 mgd. The facilities are common to all alternatives, including no action (ESP). The sludge disposal facilities would consist of an 8-inch diameter pressure pipeline from the JWPCP to Spanish Springs Valley. At Spanish Springs Valley, the sludge was proposed to be spread on 255 acres of a 460-acre dedicated disposal site. Spreading would only occur during 9 months of the year, with application rates of less than the evaporation rates. The sludge received during the remaining 3 months would be stored and applied during the remainder of the year.

The Board of County Commissioners recently voted against using Spanish Springs Valley as a land disposal site for liquid sludge.

Sludge Pipeline Impacts

Fish and Wildlife. It is assumed that the pipeline to Spanish Springs Valley will be buried. The pipeline will cross the Truckee River once. Riparian and aquatic life will not be affected by the presence of the pipeline except if a ruptured pipe allows spillage into the river.

Energy and Chemical Use. Electrical energy will be required to pump the liquid sludge from the plant to the disposal site. Energy required for sludge conveyance will be approximately 660,000 kwh per year.

Water Quality and Quantity Implications. Sludge will not be discharged to any surface waters or to lands within 0.25 mile of any surface water. Thus, potential water quality problems associated with sludge disposal will primarily be related to groundwater, the movement of leachate through the soil and surface runoff to drainage systems.

Rain storms may prove to have the greatest impact upon the disposal of sludge. For example, a long winter may necessitate the storage of sludge for more than 3 months.

Long or intense rainfall and snowmelt may cause the leaching of nutrients and metals from the applied sludge into the soil and potentially move off the disposal site. The amount of leaching and quality of leachate will depend in part on the size and duration of storms, the stability of sludge constituents, and subsurface water flow. The slow to moderate permeability of the soil should tend to inhibit percolation during storms but soil condition may be insufficient to deter percolation during longer duration storms. Surface runoff, which could carry portions of the applied sludge overland and eventually to a receiving water, should be controlled by the use of berms or control structures, designed to trap and retain any runoff.

The characteristics of any leachate that percolates to groundwater will depend on sludge constituents and the filtering ability of the soil. The distance between the disposal site and the groundwater discharge zone (approximately 1 mile) may provide adequate filtration of any leachate. However, there are soils in the area that are rapidly permeable which would provide little or no treatment of a leachate. Also, there may be breaks in the hardpan which could allow leachate to travel through the hardpan into the subsoil. This kind of event could pose water quality risks for nearby wells.

Cultural Resources. Sludge disposal will impact several known sites of cultural resources. A 1980 field survey by DRI located 56 artifact sites within the disposal parcel.

Some of the features, such as a small rock dam, are rare, and the total impact of the project on these sites has not yet been evaluated.

Odor. Minor odor problems could exist in the immediate vicinity of the storage reservoirs. Odors from land application can be minimized by controlling the loading rates to avoid causing the soils to become anaerobic.

Public Health. Potentially, the most direct effect to public health would be from the spray disposal of liquid sludge. Spray disposal of digested liquid sludge can create a health risk to persons on or adjacent to the disposal area. Pathogenic agents (virus, bacteria) found in digested sludge can cause illness or disease if ingested by humans. The two most typical means of infection are inadvertent ingestion of wastewater or inhalation of wastewater aerosols created during spraying. Inadvertent ingestion (e.g., drinking) can be effectively avoided in most cases by fencing disposal areas and posting signs that warn of the hazard. All water spigots, pipes and nozzles can be marked with warnings. The site can also be designed to keep surface runoff from leaving the area. The chance of persons accidentally or intentionally wandering onto a spray site can also be reduced by selecting an isolated disposal area. The land surrounding the site is used primarily for grazing with very few residences located nearby.

The health risk from aerosols is more difficult to control. Isolation and fencing of the spray area is the most effective safeguard. The nearest developments are a farmhouse located about 0.25 mile from the disposal site and several residences 1-2 miles north of the disposal site. Additional protection can be achieved by a variety of operational measures. All waste should be properly disinfected prior to irrigation; low trajectory and low pressure sprinkler heads should be used to keep fine aerosols from forming and drifting off of the site; and irrigation should cease during periods of high winds.

Soils. Sludge disposal will have a dramatic impact on a wide variety of soil characteristics. The most important impacts are from the addition of phosphorus, nitrogen, and heavy metals to the soil. Because disposal will occur on dedicated land not being used for agriculture, addition of these constituents is not regulated by any agency guidelines or requirements.

Energy and Chemical Use. Energy will be required to pump sludge from the storage lagoons to the application system, and also to incorporate the sludge into the soil. Electrical requirements for pumping will be 63,500 kwy per year. Discing at least once per year will be required to incorporate the sludge, but regulatory agency requirements may require more frequent discing. At least 60 gallons of diesel fue would be used to disc the site.

Short-Term Construction Impacts of the Master Project

Construction of wastewater facilities typically results in an assortment of short-term nuisance impacts. This type of impact typically lasts for the duration of an activity in a particular local area. These include noise, dust, stream turbidity, and aesthetic disruptions as well as temporary access and traffic flow problems and potential safety hazards. These impacts are usually insignificant or readily mitigable to tolerable levels.

The Truckee River crossings (Alternatives L-1, L-6 and L-7) are likely to cause temporary turbidity problems and adversely impact water quality and fisheries.

The disturbance of the stream bed will suspend significant amounts of fine colloidal materials and organic matter from the river gravels. The result will be higher turbidity levels, higher suspended solids, higher BOD, lower DO and higher nutrient levels. The increased turbidity can cause fish kills, degrade fish habitat, and restrict fish passage.

The Truckee River corridor and lower Truckee River support an important wildlife community due to the availability of water and associated riparian habitat. The diverse vegetation characteristic of riparian areas allows them to support a more concentrated and diverse wildlife population than surrounding dry areas. Riparian habitat in Nevada is relatively scarce with the Truckee River supporting one of the principal riparian corridors in the state, thus, making this area even more valuable to wildlife and their beneficial uses.

References

Cooper & Associates. 1980. Progress report for alternative methods of effluent treatment and disposal, Reno-Sparks joint pollution control plan facilities plan. Prepared for Kennedy/Jenks Engineers.

Kennedy/Jenks Engineers. 1980. Draft master project facilities plan, expansion of Reno-Sparks joint water pollution control plant. San Francisco. Prepared for the Cities of Reno and Sparks.

Pacific Environmental Laboratory. 1979. Effects of the Reno-Sparks joint water pollution control plant on water quality of the Truckee River: study report, appendices, and summary. San Francisco. Prepared for the Cities of Reno and Sparks.

U.S. Environmental Protection Agency. 1976. Quality criteria for water. Prepared by Office of Water & Hazardous Materials, Washington, D.C. 256 pp.

U.S. Fish & Wildlife Service. 1977. Cui-ui recovery plan.

_____. 1979. Restoration of a reproductive population of Lahontan cutthroat trout (Salmo clarki henshawi) to the Truckee River/Pyramid Lake system: preliminary special report. Reno. 131 pp.